

TRAINING

FOR HEALTH

STRENGTH

SPEED

AND AGILITY.

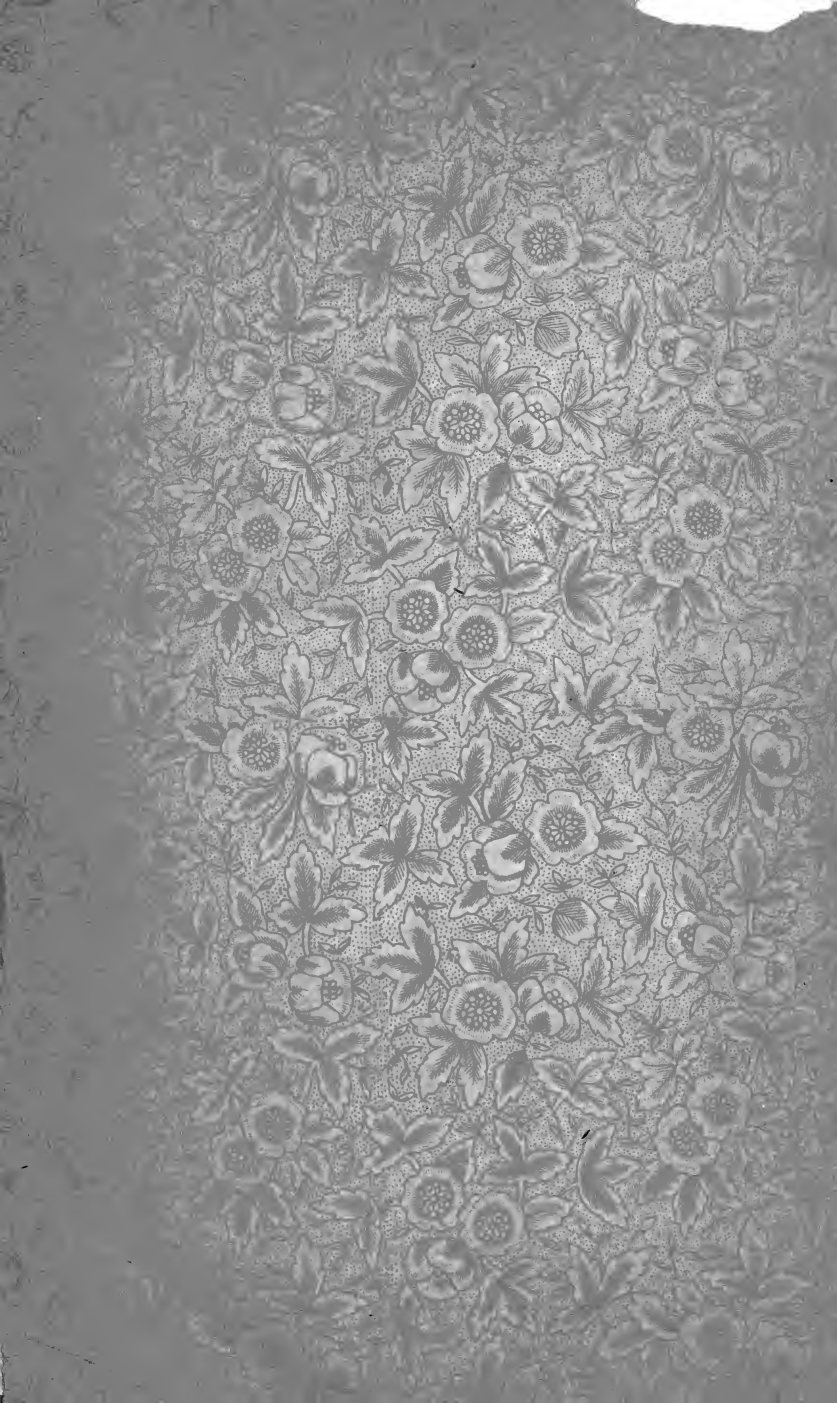
J. P. THORNTON

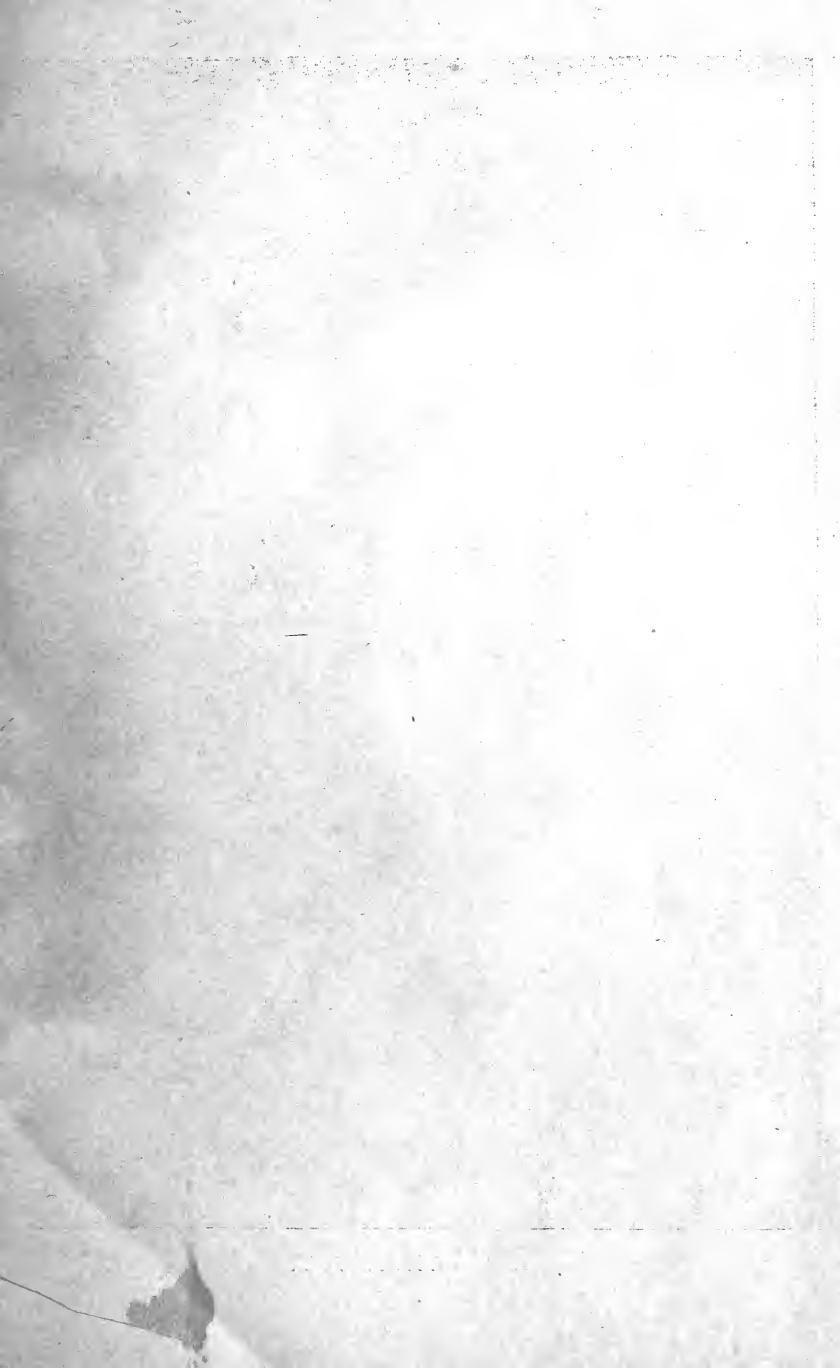
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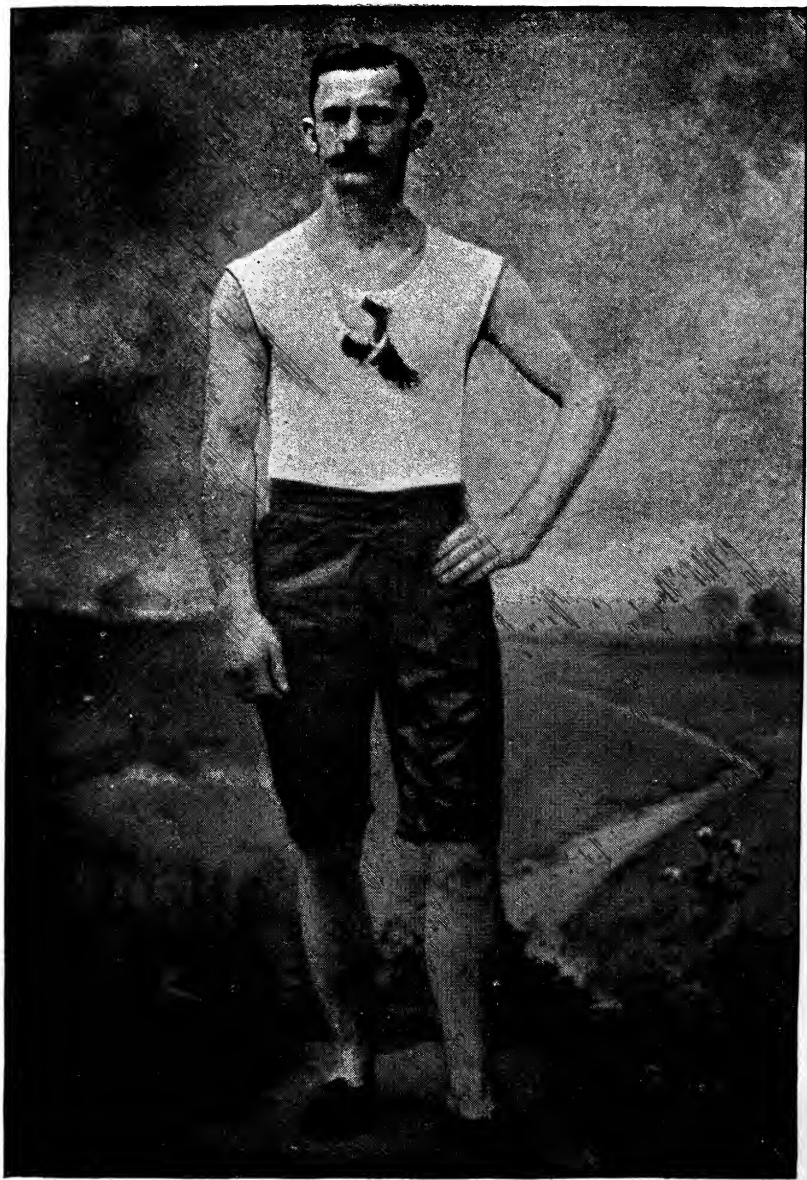
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UNITED STATES OF AMERICA.







JOHN P. THORNTON.

TRAINING

FOR

HEALTH, STRENGTH, SPEED,

AND

AGILITY.

FOR THE INSTRUCTION OF AMATEURS.
AND OTHERS.

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BY
JOHN P. THORNTON.
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PREFACE.

THE aim of this volume is to explain, firstly: what are normal physical conditions; secondly: how these are capable of improvement by exercise, providing the efforts made are carried out in a scientific manner.

As this work is written for the use of amateurs, it is addressed to an educated public. To such all rule of thumb methods of training would be irksome. An intelligent man always wants to know the why and the wherefore of everything he is told to do. He naturally declines being considered as an automaton. If exact information is then afforded, there can be no question, but that just because he knows what he is about, improving mental and physical conditions follow.

No attempt has been made to teach the peculiarities of any one special exercise. A man can learn some little as to how he should run, or jump, or row, from the many excellent books written on those special subjects. There is, however, no royal road to getting strong. Time is a necessary element for physical development. To acquire Health, Strength, Speed, and Agility is

always possible, and it is for this purpose that this volume has been written. No athletic sport in favor to-day has been omitted, and the preparatory methods, those which will best serve the amateur, are presented.

Care has been taken to point out what are the disturbances arising from either excess of work, or from exercise taken in a wrong direction. "Training for Health, Strength, Speed, and Agility" may be deemed over-cautious, but there is no one practically acquainted with athletics who does not deplore the many accidents which have fallen under his own observation. It is not broken limbs that are regrettable, because fractures and sprains are by no means singular to the gymnasium or the track. What is meant by "accidents" are those arising from expenditures of force by those who are immature, and the lasting shocks given to systems. Fully aware of these responsibilities, an author would be culpable did he not give expression to what he thought were the dangers of over-training, not in relationship to performance, but as influencing health.

Particular allusion has been directed toward the keeping men and women, who do not train, in good health by means of moderate exercise. How children should be taught a natural development is also presented. The past and present systems for the prevention of obesity are given, and methods explained; how growth of fat can be prevented, considerations of health always being remembered.

This work is the outcome of many years of practical

experience, where how to train was guided by study, not exclusively acquired in the gymnasium or on the track.

“Training for Health, Strength, Speed, and Agility” will be found not alone useful to amateurs, but will give its aid to teachers of physical culture, and to parents and principals of schools.

JOHN P. THORNTON.

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TRAINING.

CHAPTER I.

THE ALL-AROUND MAN.

Looking over the man—Men adapted to special work—The man in perfect training—What he ought to be—What he is—The undefined quality—The mistakes made—What are our limitations—Will power—The all-around man—The ambitious athlete.

I AM in the training-ground, and my attention is called to a young athlete. Some one in charge says to me, "There is a man in perfect training." If I am conversant with looking over men, as is a horse-trainer with blooded stock, my reply might be, "Yes, that man looks all right. At his age, he is likely to improve. I should think he has resources which can be called upon for great efforts." I might add, "I would be careful, however, not to push him any more, for he seems to be at his best—that is, as far as looks go. What is he in training for?"

If I am familiar with athletic exercises, I ought to be able to place the man as to capability, for certain general lines of performance, but neither am I or anybody else so absolutely proficient, as to put a man at once in the

class to which he exactly belongs ; nevertheless, I can settle in my mind several lines of performances more or less allied in which he might excel.

The trainer answering my query, gives me the information. His reply may be, "That is our best hurdler, or our crack sprinter, or our cleverest jumper." Having that much given me, which of course is a great deal, I take a more careful look at the man. Having satisfied myself first as to his general development, I look at the head and eyes of the man, in order to find out if he seems possessed of will and determination. I must confess, that any study of physiognomy may be delusive, still I do not omit it. What I scrutinize particularly is the man from the waist down to his toes, because I have been told that he is in training for speed as a runner. It is below the waist that I want to see the higher physical development of the man. I require a certain balance of muscular power, distributed evenly all over him. If his wind mechanism is bad and lung power limited, my opinion will be that he will have little staying power. If the chest capacity were good, and legs and thighs not first-rate, the chances of his being successful would be but slight.

I do not care much about the height of the man, that is within certain limits, because both big and little men have been wonderful performers. I am, however, inclined to prefer the man, for field athletics at least, who does not exceed five feet ten inches, and for the reason, that distinct muscular power, not being augmentable by

exercise in proportion to length or breadth, the bulk of an additional inch remaining, being a positive fixed quantity, this extra weight to carry or to propel, is something which handicaps, in some small measure, he who possesses it.

I vary then my appreciation of the man, when I understand what he is trying to excel in. From the above, which everybody can understand, it will be at once understood that men must train for special performances.

The ideal definition of a man in perfect training would be an individual who by judicious exercise had obtained uniform development of muscles. It ought to mean too, something more, as to the performance of this highly-gifted individual. It would be, that he could successfully accomplish any kind of work. In actual observation, however, we find that although there are many superb "all-around men," it is rather exceptional to find that any one man ever can accomplish more than a single thing with exceptional excellence. To account for this, we must face the fact, that there are peculiarities of human build, or of muscular individuality, which render the one man capable of doing something better than his fellows.

Mr. Myers' muscular development might through careful measurements have been presented in fractions of an inch, but that never would have accounted for his wonderful bursts of speed. No tape measure would indicate the reasons why Mr. Page can clear a higher bar than another

man. General measurements may be about the same between the first and the second man, but the particular, the special reason why A is a fraction or second quicker than B, or C can jump an inch higher than D, no one ever will determine.

Such a blunder nobody is likely to make, as of trying to have a natural sprinter take a place in a tug of war team. Still many men waste their time in attempting to do exactly that thing for which they are physically incapacitated. I mean, of course, when with laudable but mistaken ambition, young men try to take first places, so as to get their names on the record.

I often see in training clever lads working the life out of them in endeavoring to overcome their own bodily inertia. Endowed with normal muscular power, they believe that by exercise, they can impart that increased strength to their arms, which will finally overcome the dead bulk of their bodies. Their arm strength increases, yet no one can accomplish the impossible. If they are wise, then, they should leave feats of agility to lighter men. It is just in cases of this kind that the professor of athletic exercises explains to pupils the futility of such work. Carried out so as not to overtax strength, such exercise may do no harm, but if insisted on to too great a degree, the effects are unquestionably bad.

Like in mental occupation, or literary work, the best thing for a man who aims to excel in athletic sports, is for him to know at once what are his limitations. He

may find out that his field is curtailed. He may do one thing well, but only that one thing.

I am positive that no book will ever give a man, save in glittering generalities, the exact kind of work he is best adapted for. It will ever escape the most gifted of writers to describe the indefinable element called pluck, or grit, or that will-power which accomplishes miracles. To call it as a mental power, when physiological considerations are borne in mind, is contrary to science; but yet, how otherwise account for what seems nothing short of an electrical discharge of force? Since muscular power is called upon by the will, it must be from the brain that the action is transmitted.

I have presented the perfectly trained man to be one who contains within himself a thoroughly developed muscular power; and the supposition is, that all the thews and sinews of this man will respond to every call. This is an ideal condition. The man is not special, for it must be remembered that his powers are general.

This "all-around condition," difficult to arrive at, can only be brought about by long, diligent, and careful methods of preparation.

It is not my intention in a book on physical culture to emphasize any particular line of work, giving it the preference above others. We all of us have our likes and dislikes. As far as the pleasure of it goes, my delight is greatest when I see a foot-race, and I am (I cannot help it) quite indifferent to a walking-match. No one appreciates more than I the work the walker under-

goes, and I know that, to win, depends on perfection of form, with pluck and endurance carried to its maximum, and yet the exact "heel-and-toe movement" is nothing else than a hampered gait. The man, to go fast and long, is forced to bring into play certain movements, with a huge expenditure of muscle, which nature never intended for such a precise purpose. To encourage the walker, the trainer will lope alongside of his pupil. I have walked fairly fast myself in a match, and I remember my coach running alongside me going easily, his toe taking the natural spring from the ground, and his crying to me, "Now you are putting me to all I know how." I was, however, always saying to myself, "How stupid it is for me to be working my life out learning an unnatural way of going over the ground, wriggling my hips all out of shape, when I could get along so much faster and pleasanter if I were to run." I have, then, my preferences, but in a work of a general character like this, I shall do my best to give every exercise its full value.

I believe in the all-around man. I have always thought that the method of tempering good steel was applicable to the physical education of the man. Once (my subject being young) that I succeeded in bringing up a certain temper or efficiency, then I have thought I could make at will hard or elastic, rigid or supple metal out of the man. What kind of an instrument he was to be fashioned into became then less a matter of chance. The man's own tastes took him into the lead he was to follow.

CHAPTER II.

ADVICE TO TEACHERS AND PUPILS.

The advantage of varied exercises—The duties of the teacher—
Selection of pupils—What is exercise—Muscular force—The
stimulant—Our every action tells on the muscular system—
The two sets of muscles—What are antagonistic muscles—
Elegance is excellence.

NEED I say that no man ever was made strong by book-reading alone? Close study, with its confinement, induces positive deterioration of muscular tissue. Over-brain-work reduces the strength of the student. The value of books which treat in a sensible manner physical development, lies in two directions: First, particular exercises are explained, which help to build up the system; and secondly, the reasons why such and such things are done, are made clear. Of the two, the latter is of the greater importance. Illustrations of the devices employed, the weights, the pulleys, the apparatus, are good enough in their way. A visit of five minutes to a gymnasium makes not one mechanism, but twenty of them understandable at once, when hours spent in the examination of wood-cuts would not suffice.

In the best equipped gymnasiums, the reasons why certain exercises are to be carried out in preference to

others are not always made clear to the beginner. A professor of physical exercise is generally a very thoroughly occupied man. It is only of late years that he is an educated man, able to give the reasons for certain kinds of exercises adapted to individuals. With a numerous class of pupils, where different conditions exist, the teacher can ill spare the time necessary for long explanations. He may be more or less right in considering his class as a unit and in trying to bring it up to one general average.

I am positive that the public school method, which takes a low average as a standard, though it may not bring forth the highest development of the pupil, is, however, not wanting in wisdom. Lads (I am writing of school-boys) may be pushed beyond their powers, and their future natural development is thus impaired.

I think the trouble with boys of normal powers who are ambitious to excel in manly sport, is this, that they are urged too much. They want restraining, not egging on.

The best professors of physical culture have often told me that to arrive at anything like a satisfactory result, the limit of a gymnasium class of youths should not be above six. There are many simple exercises in which no account need be taken of numbers, but for careful work they think that six is all they can manage at a time.

"I spend," said to me the most conscientious of professors, "hours over my class of six. I first pick them

out from the mass, assorting lads in small squads, according to age, size, and build. I do not begin until I have taken into consideration more than the outside make of the lads. I look them all over, and go as far as stripping them. I never should forgive myself if the slightest indication to heart disease escaped me. If I only know that it exists, then I am not afraid of it. I even hope to cure it in time, but I want to be careful. I sometimes make curious mistakes. I find out the more I think I know, the less I actually do know. For instance, there is Mr. G——. He has just broken one of the records at an intercollegiate match. I had him as a lad when he was thirteen. He is twenty to-day. His was the poorest physical development then you ever saw. Pulmonary weakness on the father's side. I was afraid too of other organic troubles. I was exceedingly careful of him, just as anxious as if he had been a delicate girl. What was best in him was his courage. My difficulty was to hold him in. If I had let him have his own course, like a candle with too great a draught, he would have been burnt out at once. Gradually his condition improved. I was stricter with him than ever when the change for the better came. He became more manageable as he grew in years, and you see the result—a big event won by him—which he never could have carried out if he were not to-day absolutely sound. Nevertheless, I am still cautious with him. He wrote me a letter giving me some particulars of the contest, and I have replied to him praying him only to try and

keep in form, and not to over-tax himself. I wish I could explain to my own satisfaction, why it is that taking two pupils as nearly alike as can be in a physical way, one goes ahead under the same work and the other makes no progress. I am certain that mental energy has much to do with perfect physical ability."

This brings me to those considerations which are necessary to be understood when the study of bodily exercise is made, with the end of perfecting the health, or the skill, or the power, of the individual.

What is after all work carried out by means of the body? Whether in an amateurish way I hoe my flower-garden for an hour in the morning, or my neighbor the kitchen-gardener plants cabbage, for the same time, the muscular power exerted by both of us is practically the same. But the differences are those of our individualities. I work with my hoe for an hour, because I like to do it. My neighbor labors over his field, because he has to. He may wear himself out. There is no necessity for my exhausting my forces. I can stop when I please, for I am at play. If fatigued, I can take my rest just as long as I please.

My neighbor cannot afford to rest. Whether it rains or shines, he must keep on at his task. He may be overworked before he began his toil with his cabbages. The labor may be violent; he must not stop. My little work which I call exercise, has made me feel all the better for it. His heavy labor may have done him no harm; nevertheless if he has not had food enough, or

of the proper kind, or his sleep has been bad, he is more likely to suffer than I.

In a physiological point of view, then, the bodily exercise taken by the ditcher, and the young collegian who spins over his hurdles, are both the same, for exercise and labor are synonymous terms. In one case, if a man works too hard and is ill-fed, he breaks down. On the other side, a man may expend a vast amount of muscular power, and having his losses made up by means of proper food, good housing, and requisite rest, he can keep to his work with no inconvenience, and finish a herculean task in almost as good a condition as when he started at it.

I do not care to enter into a too lengthy study of the muscles. Generally the muscles may be described as bundles of fibres, having two extremities. The muscles are closely united, and are attached to the bones. All muscles are contractile. They shorten themselves. A tension, or a pull, then takes place on the bone. It is the brain power that starts the pull or improvises the pulley. I want to move my arm. My arm moves because my brain wills it. On the flexed muscles of my arm I put a 20-pound weight. I have not exercised those particular muscles, and the weight refuses to rise, any more than had my arm been made of wood. Will is worth nothing at all in this case. I have, however, exercised these particular muscles. I will that the weight shall rise. I straighten out my arm. The muscles which have been trained and exercised, at once

obey the will power, and the 20-pound weight rises. My brain has acted as the stimulus.

When we learn that in weight the muscles make up rather more than one-half of the human body, we can at once understand, apart from their power, how much they have to do with the nutrition of the body. Nature could never have distributed muscles so abundantly over the human frame, if they had not general work to do.

Studying the subject more carefully as to muscular movement, we come to this remarkable conclusion: "That contractility is a force inherent in muscle, and is not supplied by its motor nerve." Bear in mind that will is the stimulus, and that though the muscles are there in a man's leg or arm, it is not the muscles which give out first, but the stimulus. I think anybody can understand this. The sprinter has run his course—and say he has won. The rapidity of his motion has been so great that he is dead-gone for the fraction of a second after he has passed the tape. If the muscles of his legs or thighs could be weighed or measured, then would they have shown a change? Certainly not. But what prevented him going even a foot further in his course? He had used up his stimulant. Because the work he had cut out was terribly severe, he called on his own stimulant, his will power, for its last possibilities. The stimulant did give all it could. It could do no more than that.

It is not muscular force that is gained alone by exercise, but exercise increases not only the effects, but the

duration of this stimulant. We can call upon this stimulant for a longer and more continuous service.

How otherwise can I explain the fact that a man shows a tremendous increase of power far beyond his muscular development? It can only be derived from certain improved qualities of stimulation, which the man called into existence, through judicious training. What we all agree in is, that this stimulant is an intangible thing, which cannot be weighed with a scale, nor measured with a tape-line.

Muscular force in its unity is something often lost sight of. I move no portion of my body without calling into play an endless number of muscles. There is not a muscle on my left side that does not respond to the movement of my left leg. It is not alone the muscles on my left that are put into motion, but there is a yielding on the right side of my body to the active work of the muscles in my left. If there was not what is called antagonism, I should work stiffly, maybe not at all. I would always be getting out of plumb.

If I had a mast properly rigged and held in position by two stays, securely anchored, and I wanted to pull the mast on one side in a line with the stays, I should have to overcome the resistance of the stay on the other side. What a wondrous movement it is then in our bodies, which almost automatically causes the other side, say it be on the right, to give way gradually to a left-handed movement.

When a man puts the hammer, there is no single muscle

of his body that he has not trained to work in unison. The toes of his foot he has put to the front ; on the heel of the one which he keeps in the rear, he balances himself ; the muscles of his waist, the thews of his neck, the very movement of his head, all give the additional foot or inch to the distance his hammer has been launched.

It was not his arms alone that did the heaving. You never can then put your finger on one muscle and claim for that the entire effectiveness for doing work. In fact, the localization of any effective muscle is lost when geographically considered. I know that I do think by means of my brain, and that in this bony box, my skull, my thoughts are engendered. I strike a blow with my arm. I am wrong in my appreciation of muscular localization, were I to insist that my arm alone struck that blow. It was at the end of the arm with the clenched fist that the blow was delivered, but the power of that blow emanated from every muscle in my body. Those muscles did not, however, all work in the same exact direction. Some of them could not. What they did was their best, but of a different kind ; that is to say, some of them gave just as little hindrance as they could.

This matter of a man's having two sets of muscles, working apparently differently, but all tending to the one end of perfecting the man, should be thoroughly understood.

All important muscles seem to have their antagonisms. We should be muscularly erratic if it were not

for this. These antagonistic muscles are the wisest of natural brakes. There is an interplay of these two different sets of muscles. We train without our appreciating how much we are indebted to these two muscular systems.

When we are perfect in physical exercise we actually do get, as it were, a new sense, which for want of a better term, we may call muscular sense or perception. If we did not educate that sense to its highest degree of excellence, we would waste power with every action we made. There is no neat athletic feat that does not owe its perfection to this unconscious muscular sense. It regulates the initial impulse. If either of these two sets of muscles are brought too much into prominence, there comes stiffness, and stiffness means want of co-ordinate power.

Sometimes troubles arise from too much work imposed in one direction and none at all in another. I have, say, exercised the particular set of muscles I designate as A, and I have produced a force which I call 5. I have neglected the opposition muscles B, which remain at their normal 3. Their resistance takes then 3 from the 5, and my result is but 2. I ought to have worked up the relaxation of these resisting muscles, so that they had given the least antagonism to the muscles A. I might never get the ideal 5, but probably a $4\frac{1}{2}$ power.

Tyros in gymnasiums always show in a distressing way the pull-back of their antagonistic muscles. This

brings about awkwardness. The experienced teacher sees at once what there is at fault, and hence gives certain pupils particular exercises.

Take the danseuse. She is the embodiment of human grace, having under automatic control all her muscles. When she learned her calling she studied but one movement at a time, then two, then many. She acquired the art of making every new pose and each new step harmonize with those she had learned before. She has educated her two sets of muscles, otherwise she would be clumsy.

The perfect mastery of all the muscles brings about the acme of grace, and grace is excellence.

I never saw a great runner who did not carry himself with a certain amount of elegance. Even at the conclusion of a terrible struggle, the last five yards, a great racer keeps to his form. Let him make the slightest blunder,—and to blunder is to be awkward,—and he is second or third best, and not the great first.

CHAPTER III.

THE INFLUENCE OF WORK.

What are the muscles—Exercise brings about circulation—Close connection of all the functions—What is a congested condition—Muscular activity and temperature—A muscle to work properly must be warmed—The muscles at rest—Work without apparent movement—How it tells on the muscles—Connection between brain and brawn—Fatigue—Automatic exercises.

No muscle is ever brought into action that it is not in a measure wasted. If this waste were not at once made up, powers would wane. How, then, can muscles be restored? By means of the blood. The circulating fluid flows through all the veins, always pumped into them by that great engine, the heart, and the blood lands in each muscle exactly those elements it wants. Hence it follows that no motion can ever take place without increase of circulation.

I may state that physiologists are undecided whether this increase of circulation is due entirely to the mechanical action of the muscles. It is much simpler to believe, as I do, with others, that this increased circulation is, for the major part, mechanically induced. The harder I work, the quicker, the more intense is the action of the blood. No one function of the human

system can take on independent movement. All of them follow suit. If I am to carry on more steam I must put in more coal. Wanting to move faster, the stroke of my piston-rod is accelerated, and the fly-wheel makes more revolutions. The heart and lungs of a man in exercise are called to do more work, and that, too, in briefer intervals of time than when he is at rest. We must breathe more quickly. If we do not, we dull the fires, just as if we were to put a damper in the draught of a stove.

I want to have this most important fact borne in mind, and it is the close relationship existing between all the functions of the human body. I cannot lift the slightest weight but that the stimulant of such exercise affects the brain. Where else than from the brain comes the will which makes me raise the weight? When, therefore, I exercise, I not only improve the subtlety of my muscle, but of my will, and it is on account of this that it may be safely said that exercise "favors the brain and the work of thinkers." Thence it happens that if physical work be carried to extremes, a time must come when the blood courses so quickly that something or other in the human system gets out of stroke, as it were, and then what is known as congestion takes place.

We need not be the least alarmed at the word "congestion." A feeble man rolls six of the ten-pin balls and is used up. The pugilist stands up for forty rounds and then gives in. It is not that the pugilist has been

so much battered, as that he has reached the limit of his powers. His period of congestion has been arrived at. It is not a dangerous crisis. We get over it.

Many who live in the cities, and who are fat and lazy, get to the condition of congestion whenever they mount the steps of an elevated railroad in order to catch a train. Perfect training puts further and further back the time of congestion, or if congestion does come, serious effects are not to be dreaded.

Too much stimulation brought about by excess of physical work is something to be guarded against. A man may wear himself out. This wearing out is not confined alone to his muscles; it is all over. It is not only muscular development that halts, but the brain power is diminished. Cases of this kind are exceedingly rare, because nature has her own safeguards. Before the crisis is reached the check comes of its own accord.

Muscular activity is increased when outside temperature rises. Movements would be dull in a gymnasium kept at the freezing point. The question of the elasticity of an individual's muscles is not alone to be considered, when he is exercising in a temperature of 32° F. He is not only not so springy, but he is actually weaker. It comes down to this. In order to get good work out of a muscle, and when you call on one you call on them all, that muscle, or all of them, must be warm. Do we not say, "wait until you see that man warmed to his work"? Unconsciously, then, we warm to our work whenever we want to use any muscular effort.

This is exhibited in a hundred ways, not alone by ourselves, but in the lower animal creation. There is the pianist. If the concert-room be too cool, he will be sure to clasp his hands together, closely interlocking his fingers, so as to warm them. He tries to increase the circulation. The blood moving faster supplies warmth. A man may be in a passion. Say he is a cool man, apparently, and conceals his emotion. We are not to suppose that he is bereft of peculiar sensations. His heart moves faster. His circulation increases, and he is unconsciously warming himself up for his onslaught. If he is to strike a blow the muscular preparation has commenced.

Take a dog just before he jumps at you. His hide becomes wrinkled. The mouth snarls, he shows his fangs. Nature is warming him up. The tiger, before he springs, lashes his tail. Take a horse and run him at once on the course, without a previous canter or warming-up, and the jockey will tell you you have made a mistake. All this is nothing more than the preparation of the muscles. When you take rest and the body sleeps, the muscles rest and temperatures fall.

Many a man in training knows how strange is the feeling when he rises in the morning half asleep. He experiences a certain numbness of muscle. I remember when closely associated with a rowing crew, to have watched the stroke oar get out of his bed after a sound night's sleep. It was a cool May morning. There was an expression of horror on the young man's face.

"Anything wrong?" I asked.

"Wrong! I should say so."

"Stiff or sore?"

"No; but I felt I had muscles yesterday, and I know I am all bone to-day." Then he clapped his hands together and stamped his feet on the ground, and said with a smile, which ended in a hearty laugh, "Why, here they have come all back again! I am all right. I was wild for a moment with some strange ideas; I fancied my muscles had kept longer asleep than I did." That really might have been the case.

The limit of effectiveness of the muscles is found when the temperature of the blood approaches 45° Centigrade, or 110° F.

Here are my muscles, or systems of muscles, sound, in good condition, and improved through proper stimulations. They have withstood the heavy stress put on them. I am not satisfied. I want more work out of them. I call on them, in and out of season, and then comes what is known as a feeling of fatigue. My muscles are wonderfully made. No steel nor catgut can compare to them, but there is a measure of durability to everything, and I am wearing my muscles out. Keep on coiling and uncoiling a spring, and carry that out long enough, and the contractile power will wane until all the natural elasticity goes out of it.

Just here comes in the consideration of that wonderful stimulant. The duller man is the one who, running in the foot-race, has used up his muscular power. He

has been willing with an inferior will. He has drawn on all his stimulant, such as it was. Another man has started in the contest with, say, just the same normal amount of muscle and of an identical quality. He has been just as lavish in the employment of these muscles. The supreme moment arrives. He calls on himself for the extra stimulant, and it comes. His battery of reserve works the stimulant into the muscles; they contract again and again, and he forges ahead and wins. That is what was meant in a previous chapter, when marvellous outbursts of power were mentioned.

Because man has the most brain, this prevents him injuring himself as would the lower creation through over-fatigue. Get to the limit of the use-up of the muscle, and the man stops. Will does accomplish wonders, but physical pain has, too, its own sway. There is no necessity of using violent exercise to convince us of the dominance of human sensibility. We can dispense with pumping a man on the track, or getting him congested, to show that.

Hold out your right arm and keep it there, and see what happens. It would be the most reprehensible of all exercises if introduced into a competition. Soon the pain occasioned by such a position becomes evident. One good authority puts the time when a man can hold out his arm at being five minutes and twenty seconds. The limit, I think, is six minutes. I never saw it held more than five minutes and twenty-two seconds, though

I have been told it has been done with a few more seconds added. The deltoid muscle declines the work. Yet there is no apparent real work. But there really is, and a vast amount of it. There was a constant, noiseless fight—none the less hard because not visible—between the two antagonistic sets of muscles. The experimentalist had stimulated himself, and kept on stimulating all he knew how, but it was of no use.

Besides the real display of power in keeping up the muscular equilibrium of the arm, the one of motion was absent. The repairing fluid worked in a certain way, but its "head" or circulatory pressure was much diminished. There was, too, actual compression of certain muscles. So we see that, after all, how to account for a very tired arm is somewhat complicated. Bear in mind here, that, distressing as is this work of holding out an arm, its effects are not alone physical, but mental. The consequences might not be alone evident in an aching arm, but in a disturbed head.

I want to call particular attention again to the close connection between brain and brawn. Professors of physical culture never overlook it, but pupils are inclined to pay too little heed to it.

Without getting into any unfortunate condition of mental exaggeration, watch out all the time whether your brain works as well as do your muscles, for you might exhaust the first. Moderate exercise for beginners is, then, the golden rule. As you go on with your

work, your mental power—the possibility of securing the stimulant—should increase. When you find it failing, and you are listless, make up your mind that you have been overdoing it. Stop for a while, or work with the utmost moderation, until the proper balance is restored. You can see now, in many ways, that power really exists in your brain, and how it is almost always the directing agent.

I remember to have seen a professional long-distance man who ought to have raced past an adversary. He lost the match.

‘What was the matter?’ I asked.

“Matter? Matter enough. An hour before the race I had a letter telling me of the death of a man I loved—a man who had befriended me in a hundred ways. That took all the spring out of me. I sha’n’t be good for anything for a month to come.”

I could hardly blame the man for his sensibility, though it had made him lose the race.

Fatigue—ordinary fatigue—is a premonitory symptom showing that the body needs rest. It is like hunger, which is a natural call for food. But if I am fatigued, that does not mean a physical break-down, any more than hunger indicates that I am at starvation point. I think the description of fatigue as a kind of “regulator,” as M. Lagrange calls it, expresses the exact condition for the existence of this feeling: “We tire most when we do things which our will controls, least when they are au-

tomatic, or when work is carried on without any will of our own." If we had to think how we are pumping our own blood, or how we are breathing, we could barely stand the strain of that work for an hour.

The less, then, we have to think how we do a thing, the more automatic we become—the less tired we feel.

CHAPTER IV.

LUNG-POWER.

Pumped out—When it happens—Causes for it not well understood—The possible reasons—The congested condition—An excess of carbonic acid—All violent action has an effect on the lungs—Running—Sprinting—What sprinting calls for—Mental conditions affect staying powers—How a runner was beaten—The regulation of breathing—How lung-power may be increased.

WHEN I explained the looking over of a man in training, I said that my first scrutiny was directed toward his chest. I wanted to judge his lung-power. I do not care how well developed may be his thighs, legs, or calves, without the bellows and room for them to move, physical excellence in all other parts of the body goes for nothing. To be "pumped out" is the most common of all experiences, and it is not at any time a comfortable one. In large cities, where there are elevated roads and trains to be caught just on the minute, running up the steps "winds" a million or two of American citizens every day. Take the conclusion of many ordinary athletic exercises. A man runs, fails, and breaks all to pieces. No matter what may be his stimulating powers, he comes to a halt because he can breathe no longer. What happens to him very much resembles strangulation.

If you study this wind trouble, you will find that it is not so easy to understand. You may learn from your own experiences that certain kinds of exercises use up your wind powers while others do not. You blow or pant when you mount the rungs of the ladder, or swing on the rings. If you are on the parallel bars you can go through almost the whole of the exercises, may have your respiration quickened, but without any feeling of discomfort. When you stop, it is because you have used up muscular power alone. Your wind to all intents and purposes is intact.

Certain movements you will discover, however, interfere seriously with respiration. If you are a sprinter and hurdler, at once you find out what it is to be bothered with respiratory disturbances. Some experts have tried to show that "respiration" or taking in air, and "expiration" or driving it out, when regularly carried on, were the cause of trouble. This rhythm in breathing we do not think ever takes place save when a man sleeps. What we do know, however, is this, that when force is called upon, to be repeated at very short intervals of time, then breathlessness comes.

Anatomical studies lead me to believe that in all the exercises "that wind a man," we call into action for sudden movement the thoracic muscles, or those placed lower down (the abdominal ones). These we want precisely to do our work of breathing. No muscle can do two things at once. There is probably mechanical interference. This trouble of the respiratory organs is

not, however, so easily solved. There is more than mechanical action in it. Violent muscular action creates an additional quantity of carbonic gas in the system. We can stand just so much of that inside of us, and not a fraction more. When the quantity increases we must give in, or are poisoned or asphyxiated.

Such natural manufacture of carbonic gas in the man has been measured. Sanson says that man during his sleep gives off 0.35 grammes of carbonic acid ; while at rest and awake almost double that, but when running 1.65 grammes. This enormous increase is at once visible. Returning to those exercises, or peculiar movements which bring about respiratory trouble, it is not only perceptible in man but in animals. The kind of gait a horse takes has as much to do with his lasting qualities as with his speed. On the race-course, an expert will tell you : " That it is not so hard for a horse to trot, for that is leg work, but to gallop, that is all lung work." You may completely wind a horse in a short gallop. If you had trotted him over the distance, no violent efforts on his part to breathe would have been perceptible. Gallop then slow, and you may trot him fast.

It is running above all things else that winds the man. If you study the movement, examining the Muybridge instantaneous photographs, you will comprehend how much the man who runs is actually doing. There are certain intervals when the feet are clear from the ground, just as when a horse gallops. The runner is propelling

himself clear of the earth, sailing into space, and it is here where the effort required is immense. Think in the mile run how often a man has to do that. The sprinter must take this upward and forward spring many times in the second, and his body assuming exactly that position, when the muscles of propulsion are at cross purposes with those controlling the respiratory functions.

A man to do this work once or twice or ten times, and suffer no inconvenience, is possible. But the doing of it some thousands of times consecutively, in the briefest interval of time and not to break down, shows how marvellous is human endurance. He can accomplish this only when the proper condition has been brought about by careful training.

I do not think that fatigue includes breathlessness, for breathlessness is something distinct and apart. There is a good authority who states, that the actual exercise of the lungs is far greater when a girl dances on a tight rope, than when a man pulls at an oar. This difficulty of the respiratory organs varies immensely with the individual. I have known men with apparently a blacksmith's bellows in their chest, get pumped out with certain kinds of exercises at short notice, while others of much slighter build, with narrower chests, suffered but little. I have found that heavy men invariably suffer more than light weights, that is, when beginning their training. A course of careful exercise improved both sorts of men, but for high speed, I have thought the lighter man kept his wind a trifle longer. He had bet-

tered himself, in this respect, some few points more than the heavier man. My remarks as to these two men, of course, only refer to their speed. Not being called upon for this power of respiration in other things, even in jumping, the bigger man was in more than one respect the smaller man's superior.

To improve a man's wind really does not present such immense difficulties. The great secret of it is not to waste the strength of the pupil at the beginning. Everything depends on gradual work and instruction given the muscles. It is to be slow to-day that good work is possible to-morrow. Give the man the same thing to do over and over again, such work being chosen which brings more particularly into play the abdominal muscles. Then something like an automatic action takes place. Struggles for breath pass away, or are of minor importance.

The worst thing I know of is to start a man with poor respiratory power and to try to mend it at once on the track. What ought to be done is to keep him on his legs and work the legs, but not by speeding the man. Give him work in plenty, but not violent work. When on the track, walk him indifferent as to his style. If you do at last consent to run him, insist at first in short distances and let him work over them slowly. In time the short breath will be a longer one, and speed will come without strangulation. I find fault with any such teachings, which insist that a man can be so trained as to come in winner at the foot race, breathing as

regularly as a child in the cradle. Any one who entertains such an idea can never have seen a race. Running kept up with the element of speed is the hardest work a man can undertake. The blood tears through the veins. The heart increases its action. Carbonic acid produced by such rapid breathing accumulates in the system. There is the probability that rapid muscular action manufactures and injects carbonic acid into the blood. The best man wins, but he is and must be breathless.

The endurance and wind of the race-horse is superb. When he comes in after the race, I want to loosen his girths at once, so as to leave his panting flanks unhampered. I am desirous that he should assume normal conditions.

You can wind yourself, and really take no great amount of exercise. Mental disturbance brings about panting. Run a man and add to that distress of mind, and you augment his respiratory troubles. Raise a hare and chase him with dogs. Actually, the hare is faster than the greyhound, but the hare loses ground through timidity. He pants through fright at the first 50 yards. He might escape did he husband his resources. He breathes hard because of his emotional distress. His wind goes, and he is overtaken by the dogs.

Great runners have told me that they had acquired the habit of regulating their lung action, and that they strove to keep it in regular action, never hurrying the respiratory process. It is the will-power which comes in here.

A phenomenal runner said to me: "Oh, my legs? Why, they run of themselves. They can't be taught anything more, but it is my wind that I keep educating."

The man thoroughly versed in physical exercise comes in the winner, because he has learned how to economize his powers. He does not believe that he has the limitless endurance of a steam engine. Say he is line for the race, and knows that at the start, the runners B or C may outfoot him for the first half. He waits until they have done what is called "beaten themselves," by forcing the work. Then he has his reserve of wind power. He has kept it in abeyance, and on the last quarter he does his best, and because he has had good judgment and good training, he comes in ahead.

When I call attention to the "thoracic action," I know it is a term describing a great deal. It means that part of the human body between the neck and the abdomen. We breathe through the automatic contraction and expansion of the muscular system. What part the abdominal muscles have to do with breathing, we do not know so much about. It is probable, however, that they give a certain movement to respiration. In cases of violent physical work, such as of running, they certainly give their aid. These muscles act as auxiliaries. To give these additional force, so that when called upon, they will help respiration, I deem certain simple exercises of the abdominal muscles of imperative necessity for the runner.

I always question the staying powers of a man who, when stripped, is too much "tuckered up" below his waist.

The winded man, if in good condition, suffers but little after the crisis has been reached. What would kill the novice, is really of little consequence to the expert. Recuperative powers come into action. At once he frees himself rapidly of that excess of carbonic acid which would imperil the condition of another man.

A good many reasons are given why a clean-skinned man is alone in prime condition. Because his pores are open I know that he must get rid of his poison more rapidly than an unclean man. Well acquainted with running men, I may state for the comfort of beginners, that I have seen the most famous of them come home winners in an apparently very woe-begone condition.

The consulting physician of a well-known athletic club gave me this as his personal account of the condition of a winner, whose pluck made him the first in a hard-run contest :

"I thought Mr. H—— quite gone. It was a condition of absolute collapse. I am used to such things, but I was worried to death. It would not only be the loss of a splendid fellow, but would bring discredit on athletics. Every newspaper would have made a row about it. Just as I was in an absolute 'funk,' my brave lad said, languidly enough: 'It must have been two feet. I thought I should beat him that much.' I put some weak brandy and water to his lips, and as he sipped

it, said : ' Don't bother about me. In ten minutes I will be walking about, and good to run in a quarter hour, and next month I will have another try.' It might have been just as he said. In twenty minutes he might, it is true, have been ready to go out ; but I wouldn't let him. I had him to lay down. No, I didn't have him rubbed down. He went soon sound asleep. When he awoke, four hours afterward, he seemed fairly fresh."

" But," I asked, " might not the time come when such a man would be likely to kill himself ? "

" Certainly, ' was the reply. " And so I have just forbidden him from trying to do anything more this year. A valuable life is worth more than a record of a one-quarter of a second better than anybody else. You Americans, with your high-strung natures, are going it, I think, too strong. You do things uncommon well. I think the air gives you a certain amount of nervous energy, but do try and remember that wind, and the overtaxing of it, is full of danger. I sometimes have an idea that wind and muscle are two things quite apart. Heavy, sluggish men do not go off with heart disease from over-exercise. I do not suppose that whales die of heart trouble, but the dolphins do."

I may add that my judgment about such matters coincides with that of my English friend.

CHAPTER V.

EXCESS OF WORK.

General and natural fatigue—We can break down, and our lung-power is not at fault—The exercise of a single set of muscles—Case of the United States Register—Special dangers of overwork—Liability to disease—Heart troubles—Always keep on the safe side—Pushing lads to efforts beyond their years.

MUCH as temperate and well-considered work at the gymnasium or in the open improves bodily condition, so excess of it, inattentively carried out, causes physical degeneration.

I have made a point of examining what were the consequences likely to ensue from want of attention to the exercise of the chest and abdomen, and above all, calling on the human economy for more than it could give. In writing particularly about the respiratory process, and the inconveniences felt in certain exercises, I have tried to draw a distinction between specific troubles, and general and natural fatigue.

I can take one kind of exercise and work at it until my arms refuse to make another effort, and yet my lung power will be diminished little, if anything. I am using up some particular system of muscles for the time being. It is the simplest example of overwork, but the effects, as can be clearly shown, are complex. To explain this

“overwork” of a very ordinary set of muscles, the best example of such a case that I know is Mr. L. E. Chittenden’s account of his signing U. S. Treasury bonds when pressed for time. I make the following summary of his article, abridging it from the one under Mr. Chittenden’s signature, to be found in *Harper’s Magazine* of May, 1890 :

Mr. Chittenden began to sign bonds at midday on a Friday, and continued signing up to the following Sunday, when his work was completed. The period was then forty-eight hours. Every possible assistance was given him. The bonds were brought to him and carried away. All he had to do was to sign. There were reasons of state why Mr. Chittenden should sign the bonds, and no one else, and the bonds had to be ready for transmission to England at a certain hour.

One might suppose that the tracing of the letters of a man’s name by the owner of that signature would be the most automatic of actions. Nothing, in fact, is more thoroughly developed by use than the fingers. The act of thinking in writing a word, by an educated man, is hardly appreciable. In this case, here was a high officer of state who had naturally acquired both precision and rapidity in writing his signature. He was used to making it.

What happened to the United States Register? On the Sunday he writes, “My fingers and hand were drawn out of their natural shape.” Long-continued exertion had to some extent influenced the mind of the

Register. His memory of what happened for the greater part of Sunday morning was a blank. The whole process of the over-exerting of a single set of muscles he carefully describes. It was at the eighth hour from the start "that muscular discontent" was apparent. In a short time every muscle in the arm showed inflammation, the pain in the hand becoming intense. The best surgical aid was called in, and the arm was bathed and rubbed, but there came no alleviation. Then set in symptoms which were alarming. There was numbness, and Mr. Chittenden writes, "It was as if my arm and hand were dead." Still the fingers went on with their work. It might have been expected that the signatures would have become more and more illegible, or at variance with its original form, but this did not happen to any great extent. "The constant repetition of the same movements seemed to result in their continuance, independently of the will. The signature was still a fair one."

General physical weakness was fast setting in, and undoubtedly there was mental disturbance. It took more time near the end to sign 100 bonds than 1,000 at the beginning. The task was concluded. Mr. Chittenden's terrible physical ordeal was apparently over, and with what result? He writes: "The abuse of muscular energy eventually caused my resignation from the Treasury, and cost me several years of physical pain." Farther on he adds: "Many years elapsed before the Register atoned for this violation of the laws, which never fail to

punish those who break them. While he remained in office there was no day in which he was not reminded, by a sharp rheumatic twinge of the wrists, of that Sunday morning. After he had left the Treasury, there were five long years in which he could never promise that he could perform any professional labor at any fixed date in the future."

Mr. Chittenden's case shows the remarkable effects of fatigue of muscle, with the wane of the mental stimulant. After a while, "the will" was dulled, though it was the will of the Register that kept him up all the time. The mental stimulant had been called upon, and called upon beyond its possibilities. After a while it declined answering, and yet there was something of it left, since the fingers traced the letters. No book can present a theory so clearly as an actual case of this kind. If not for the positive authenticity of the article, it might be questioned.

The Register's disturbance continued after the task was ended, and it was only on Monday night that sleep came, and it was sleep brought about by sheer exhaustion. It may be advanced that Mr. Chittenden's physical condition at the start was not good, and this may be granted. Not being "good," might mean that his status was not equal to that of a fairly-well trained man. If the Register had had the physical condition of an athlete, he could have gone on signing with much less inconvenience. He would have kept to his task longer, but exactly how much longer nobody can say.

This, however, is positive : if Mr. Chittenden had been a better built-up man, and accustomed to muscular wear and tear, the after-effects would have been insignificant. I question, however, whether special endurance of any particular circumscribed set of muscles has ever been so thoroughly tested as in this case.

There are certain simple mechanical devices in gymnasiums which might solve localized endurance. I do not want them, however, tried. The play would not be worth the candle. What I do believe, however, is this : that the limit of endurance, for certain movements, would be sooner reached than is supposed. All I want to show here is, the connection which exists between the muscles and the brain, and that they are interdependent. Their action is correlated—reciprocal. One works on the other. Over-fatigue your brain, and your body suffers. Overwork your body, and the brain feels the depressing work.

Although the athlete is good for nothing unless he breathes well, there have been well-attested instances of men performing acts of strength who were absolutely consumptive. These men did not get better of their major complaint by exercise, but eventually died of it.

The dangers of overwork are not, then, to be slighted. The whole system can be over-strained, and then general health is weakened. This volume is written, not to quench that proper ardor for physical culture in which lies our greatest hope for the future, but to guard against abuses arising from overwork. To get the system down

to its lowest level, to keep taking away from its vitality, without giving it a chance to repair itself, is not uncommon. It is, as if a man was stripping himself of his shield of ordinary health, so that the shaft of disease directed toward him should meet with the least power of resistance. He who is thus worked down invites illness. The minor diseases which accompany youth may not be evaded, but such as are unusual, as typhoid fever ought to be rarer. There is no better *nidus*, or nest, for typhoid fever to hatch in, than the body of a young man from eighteen to twenty who has overworked himself.

I do not argue this question, because it is self-evident that a young man who is in the act of making or training himself up is more liable to disease than the normal hardened adult.

An overworked man is hurting himself, not in a special, but in a general way, not an inch or two or more deep, where his muscles play, but internally. I believe that with the peculiarities of our American climate, our chances of becoming overworked are more frequent than in England. Essentially nervous, we have a tendency toward excitability of the brain, and our men, from overwork, lose will power. To be "stale" means more than muscle deterioration. It positively includes lessened will to work. The stimulus has departed.

I need not point out how "overworking and under-feeding" bring about rapid fatigue. A man who exercises daily at the gymnasium, and finds no natural in-

crease of appetite, need not stop all work, but he ought to lessen his hours of work. Too sudden losses of weight, when temperatures show no difference, are signs of overwork. Human resistance should be gradual. A man ought to get rid of the over-quantity of fat in his system, but precipitancy in such things is to act at variance with the laws of stability.

I return to that heart action which becomes endangered from overwork. Nervous trouble is bad enough. You may stand mental sufferings; you can live more or less miserably with them, but when the action of the heart is disorganized, your race is run. Why this happens is easy to explain. When I exercise, I call on my heart for increase of activity. I want new blood all the time for purposes of repair. I force the circulation, mechanically, if you please. I use my heart too much, which really is nothing more than a big muscle. I necessarily expand and contract it to a greater degree than is normal. It is only a muscle, and if it obeys the same rules as do the muscles of my leg or arm, it must be subjected to the same troubles. I can, by squeezing my heart, flatten it out or thin its valves, and then away it goes, because its natural fibrous structure has been weakened. Sometimes the heart refuses to do overwork. It thickens and thickens, becoming denser, and so loses its healthful play, and then comes the end.

I am told that Indian runners in South America generally leave off their calling at thirty-five because of heart troubles, and an Indian runner's gait is not so fast

as it is constant. We all know what are the conditions which most readily induce physical exhaustion. It is labor carried out without enough food, or well-prepared food, and without sufficient sleep. You need not look for cases of such exhaustion in the gymnasium alone. You may find it among farm laborers, where a great deal of work is expected by employers who stint their hands in their food. Many a servant girl feels it, and breaks down in a fashionable household. She scrubs, irons, washes, cooks, and has not enough to eat. It becomes perfectly plain that we break down, not from one, but from many causes. Stripping this overworked condition of the many scientific terms in use to describe it, I may say that it often arises from the absolute tearing of muscular fibre, and may be local, or it comes about from the over-creation of waste products in the system which choke us. They may be solid, or even gaseous; and lastly, we get to that cause most subtle and most difficult to specialize, which is the lessening, or the extinction, of the will power.

I again call attention to the purpose of this book. Everybody is not born strong and lusty. Conditions of men are as different as are their environments. Young men are ambitious, and their present sound health may induce them to believe that no amount of self-imposed work can hurt them. I want to show that such a belief is dangerous. I am inclined to the opinion that over-exertion hurts many. Serious cases of prostration I know of. I have seen them, and I say regretfully that

the subjects thus affected were rarely brought back to that same degree of physical excellence they once enjoyed. I have a mortal dislike to see very young lads put in training, and "training" is different from "exercising." I know that generally nothing unfortunate comes of it, but only "sometimes," and even that "sometimes" ought never to occur.

What is prettier to see than a fourteen-year lad going free over the track with a natural gait. I know it does not hurt him, but I want him not to go quite so fast. I feel all the time like stopping him.

CHAPTER VI.

THE BODY AS A MACHINE.

The body like a machine, but only up to a certain point—Exercise changes its condition—After work, repose—Methods of human repair—How relief comes—Rest—How different exercises tire—Endurance—Troubles arising from over cerebral stimulation.

WE are prone to compare the human body to a machine. The simile holds good, but only up to a certain point. Our food is our fuel; the mental power, the stimulant, or the steam, is created, and the arms, the pistons or the legs or the wheels, move. But here the likeness stops short. Every time I fire up my boiler I use up my grate-bars, I wear out my boiler, I grind out by friction the piston or the bearings. I may fire away all I please. In a certain definite time my engine must stop for repairs. To set the machine of iron, steel, or brass working anew, man must come in and put in repairs.

We work the human body, we wear it away, but the repair comes miraculously from ourselves. It is impossible to imagine that we can use up muscle and repair muscle at one and the same instant. We must have repose or rest for our body in order to give it the chance of going into repair. We are burning up something

within us, for how could our temperatures rise in exercise if there was not combustion? When you burn up anything, have you not two products left—the gaseous and solid ones?

I work hard at the parallel bars or I run my mile. I make more carbonic acid than when I was at rest, and I even produce novel changes in the substances out of which my muscles are made. I must get rid of these new substances, or I would soon be in the condition of the fire-grate where the bars are clogged with clinkers. My draft must be free and clear or my fire will smoulder.

Repose then is a necessity. It is nature asserting itself. We sleep in order to restore our bodies to their normal conditions. We make up then for the waste of tissue. We strike work for repairs, or we get our burnt products or ashes in such a condition as to most easily discharge them.

There are certain conditions, particularly accentuated in the muscles, which insist on rest. By overwork we render them locally over-excitabile. We can produce violent spasmodic effects. We have “cramps” because of the over-friction of one muscle on another. Cramps are felt by old people who do not exercise, and as far as the causes can be determined, they arise because muscles have become clogged, do not work easily one over the other, our condition with advanced years not being normal or natural.

Brief intervals of rest, even of a few seconds, caught

as it were when work is going on, bring immense relief. The accomplished performer is skillful because he knows exactly how, and when, to take a brief rest. I know of no better comparison than that of the vocalist, who sings so well and yet takes breath. The opera tenor inflates his lungs so quietly that when he does, it escapes you. How exactly then to take rest while at work is a talent.

In running, relief may sometimes be had by a change of position, or the stride, but a man must know exactly how to do it. It seems really marvellous how a well-trained man will apparently gain perfect equilibrium, after violent exertion, by taking an instant of rest. An untrained man would require an hour or two to get him back to a normal condition, while one or two minutes suffices the athlete.

An excellent authority on such matters, in describing the "time" allowed between the rounds according to the rules of the ring, believes that the fact of the thirty or forty seconds permissible is entirely too long. Expressing himself as decidedly on the side of humanity, he thinks that a prize-fight would subject the combatants to less bodily harm if they were allowed no intervals of rest. His argument is that, with their perfect training, the pugilist gets himself entirely back in the quarter of a minute, and then his arm, or his fist, or his entire muscular system, is as good as ever. Hence the blows administered at the last round are just as telling as the first. If the battle were fought right out without a sec-

ond's rest—a brush from beginning to finish—then, he insists, that (with certain rules) the injuries inflicted would be diminished. It is a French authority who writes this. He may be sound theoretically, but evidently knows little about boxing rules, nor of the many resources, other than physical ones, pugilists possess.

If we consider what are the advantages of rest to animals, we need only look at the horse when he is put on the course. In his mile burst—the best in three—with brief intervals of rest between the races, the racer is quite likely to make his last mile the fastest of the three. Endurance in exercises of certain kinds is marvellous. It would seem at first that the repose necessary after prolonged exercise might be made briefer than for short and violent work. Speaking not so much of my own personal experience, but of that derived from certain distinguished performers that have told me that “dead beat,” as they might have been after a half-mile run, they got sooner over it, wanting less absolute rest than after a ten-mile walk. The feeling of fatigue, so they expressed themselves, with continued work was “all over.” The tire had come during the long walk, little by little (not all at once, as in the mile or half-mile race), and it was only little by little that the effects of the long walk were removed by rest.

Generally, “the profession” is much more amenable to trainers' orders than is supposed by the public. Backers, who had most to do with the selection of a trainer, make it imperative that principals must obey

orders, or the purse-strings are drawn tight. I have, however, seen headstrong men, with fine legs and poor brains, who, by not giving themselves rest enough after a telling effort, having tried to repeat their performances, have failed, and never afterward reached the time of their best work. I can account for these mishaps in no other way than by their having ignored that rest between acts, which is imperative.

In such cases as have come before my notice of actual troubles arising from overwork in exercising, they were so visible as to require no diagnosis. But there are some complaints of a nervous character which are, however, very difficult to localize. The over-stimulation of the abdominal muscles does, sometimes, bring about peculiar troubles. Certain ganglia seem then to exercise abnormal power, and there are well-defined intestinal disturbances. Something like acute dyspepsia sets in, and the digestive powers are seriously impaired. I am forced to make the statement that conditions of this kind are prevalent, and, what is worse, that they are exceedingly difficult to cure.

CHAPTER VII.

FATIGUE.

Fatigue and hunger considered—Endurance with the trained and untrained—Adaptiveness—Improvement of bone and muscle—The race-horse—Local disturbances overcome—The help nature gives.

I HAVE said that the feeling of fatigue bears a marked resemblance to that of hunger. The system wants, in the first case, rest ; in the second, food. I may not take rest or food from accidental causes, or these privations may be self-imposed, and I suffer the penalty. If I am inured to both fatigue and hunger, I can withstand their effects longer, and the reasons are self-evident. I have put my body under such excellent conditions that I bend and do not break. The man, then, is soonest used up, when strain is put on him, who has exercised the least. The lassitude of those who never walk need not be commented upon. If they do walk, then stiffness and other discomforts set in. Mechanical action is hampered by what may be, not so much atrophy of the muscles, as entire absence of mental stimulant. Neither having been worked, both fail. By mental stimulant, I mean, of course, the peculiar willing power which controls muscular movement.

It is well to define what is this special stimulant. It is possible for a man to remain as motionless in his chair as if made of marble, and still have marvellous brain-power and exercise it. All is dead in him but the capacity to think.

Endurance to fatigue depends on physical conditions and much on habit. I can take a runner and have him try and do mason's work for half a day, and I will tire him out. I can try my mason over a two-mile track, and use him up in a quarter of an hour for the rest of his day. This difference may depend very much on the individual. I have two men well trained, and one will outwork the other, and the man accomplishing the heavier task will be the least tired. Careful training does much, but the personal factor always will exert itself. There is this, however, about it, that, when fatigue and actual discomfort arise, the trained man supports it the more readily of the two. He does not dread the after-effects of fatigue, even if his task is carried beyond reason. When I say "he is a tough man," I mean pretty much what the adjective expresses. He has hardened his muscles through exercise. These have been greatly developed, and because they exist in quantity, they can be drawn upon as a capital, and, after a certain expenditure, there is still a balance left. When a man is "tender," the actual opposite exists.

I play gardener with my rake and hoe, and in an hour I blister my hands. My neighbor, the market-gardener, digs potatoes all day, and his hands, which had a horn-

like cuticle, show no abrasion when his work is over. That gardener may laugh at me when I show him my blistered fingers. Say there is a hue and cry suddenly raised, and we both mount our horses in pursuit of a murderer. Though my hands are so soft, it may not be the same case with my legs. The gardener's general condition may be better than mine, save in one respect—his legs. I have exercised the muscles of my thighs, legs, and calves, and have accustomed them to the movements of my horse. I can ride three or four hours with little fatigue and no abrasion of the cuticle, whereas, my hard-handed gardener gets off his horse half flayed. I need not, however, pride myself on my special performances, because, save in exceptional work, the gardener is likely to be, physically, a stronger animal than I. Exercise, food, and rest being in favorable adjustment to muscular work, these not only increase thews and sinews, but absolutely improve the bony structure. Bones increase in solidity when the muscles attached to them do additional work. If the human structure did not improve, how could it withstand the increased jerking and pulling? Without a firm foundation no lifting power would be possible. Take a limber or weak crane, and what confidence could you place in it? Here is the positive proof of what is stated: If the skeleton of a race-horse is examined, though the bones may be smaller, their structure is denser. They weigh more in proportion than those of the ordinary horse. In the human skeleton this difference of denser bone in the athlete is marked.

If we go back and ask why a man who is thorough in his physical development resists fatigue better than a man who has never put himself to work, at once then we see the reason for it. I have a rough mountain road to travel, and I want a stick to help me climb the steep. Shall I take a soft, or a brittle, or a hard, tough, and elastic staff? Say I get to my mountain height. I have not broken my staff, but it is bent, and the spring has all gone out of it. I know it is good for nothing. I can trust it no longer. I have used it up.

I wish I might make perfectly clear what is meant by "adaptiveness," because adaptiveness is the most wonderful of all physical possibilities. Suppose I take an extreme case. A man has weak lungs, followed by hemorrhages. The chances are many that he will die. Nature, however, exerts not so much her power of resistance to keep the man alive, but rather tries her plastic processes. Nature adapts the man's lungs to new conditions. The man must breathe with a lessened lung surface. If the change were instantaneous from a normal or ordinary to an abnormal and extraordinary condition, the chances of local disturbances would be so violent that it would end in the death of the man. The adapting process is slow then. Resistances are gradually overcome. The machine is not as perfect as it was, but Nature satisfies herself with a second-class mechanism. It may clatter, but it does its work. Nature then of her own accord steps in, under unfavorable conditions, and repairs as well as she can a damaged mechanism.

Take conditions which are the most favorable—a sound body, a quickened intelligence, and exercise, nothing being done in excess—and then we can understand how marvellous are those new conditions.

It is the healthy tone of every portion of the human system, acquired in younger days, that continues with age. The joints in the man of sixty, who supplied them with force when he was twenty, do not creak nor grate when he is a grandfather. Nature gives us help when we try to help her. Diameters of chests increase and additional inches of muscle come. Careful physical work does something more. It exercises a power of selection within the substances found in the man. Muscles will not contract well if too much imbedded in fatty tissue. Work then dispenses with superfluous fat as nutrition becomes automatically perfect.

CHAPTER VIII.

IMPROVING CONDITIONS.

The bettering of all the functions—To strength, skill is added—
Muscular education—The many ways of doing the one thing
—The greatest economy of force—Courage—Self-reliance—
How exercise induces them.

SO far I have presented what are the dangers arising from overwork, and I shall have failed in my object if I have not succeeded in impressing the gravity of this on readers.

We will now take the optimistic side, the one so often arrived at, and it is the man improved. He has increased in strength and in health. Not one of his organs, but all of them have been bettered. Not alone all the tools he works with are of finer quality, but with them he accomplishes more, because he knows better how to wield them. The element of skill, then, has been added.

The work itself is accomplished with less fatigue, therefore the man's lasting powers have increased. Some of his movements have become nearly automatic, so well trained are certain muscles. He need not call all the time on his mental stimulant, or, if he does, it is with a lessened cerebral impulse. It then stands to reason

that, with an unimpaired stock of stimulant, when the great effort is called forth, the mental source of power responds.

I have described the work of the antagonistic muscles. When the man is trained, there is no struggle within himself for mastery. The nicest adjustments have taken place, and the awkwardness is gone. If I were to take a trained and an untrained man, both equally strong, and have them accomplish a certain piece of work neither had tried before, I might be quite positive that the trained man would perform his task more easily, more quickly, and better than the untrained man.

This educating of muscular action has its peculiarities. Lagrange writes to the effect that the expert athlete may have several ways of doing the same thing. Such little differences are not visible to the looker-on. The man who has been trained has gone through an apprenticeship, and knows how to manage himself. He may at once reject certain ways of doing some feat of agility, or combine several, and then arrive at perfect accomplishment. What he has done to achieve distinction has been brought about by a careful selection of muscular movement. This is not seen in the least by his attitude, pose, or effort in the movement. The exact combination of muscles escapes detection. He may hardly know himself how he does it. He has arrived at what is known as the greatest economy of force. Dynamometers or mechanical apparatus, used to measure power, fail to show where is the excellence of the

individual for certain work. We call it knack—sleight-of-hand.

There is one point in fine physical training which is often overlooked, and that is the positive development of courage in the individual. If there was nothing else than this one effect gained, as the outcome of perfecting the man, it would be all-sufficient. The reason why personal courage increases is manifest. The character of the will has been improved. It becomes more tenacious. It has tested its powers of resistance. It may differ as to nicety of distinction from what is known as moral courage; nevertheless, since man was born, it is physical courage which has made him master over the brute creation. It is difficult to class physical courage as something apart from known muscular powers. Courage can exist, however, in the weakling, in the man of slender proportions and soft muscles, but it is rather the mind that stiffens such. Mental courage is that superb brain-force which makes a brave man of him who is naturally timid, as the officer who nerves himself in battle, and stands apparently calm when the ranks are being torn by an enemy's shot and shell. The heavy punishment a man receives in a prize fight, the feeling of exhaustion which dazes the sprinter, the faint of the plucky stroke-oar, all of which have to be resisted, are examples of that physical courage the well-trained man has created. With the adult, or the young man under normal conditions, physical courage is naturally developed. The germ of it becomes implanted

earlier when lads take to exercise, and it has greater fruitage.

Exercise brings self-reliance. Knowing that my mechanism is good, appreciating its power of resistance when I take personal risks, I do not lose my head. What matters it if by a misstep I fall into the water, or my canoe is upset? It is only the minor question of wet clothes. I know that I can take the most perfect care of myself. Assured of that, suppose some one else falls in the river, and I know that he or she is helpless. If I can look out for myself, why not look out for the man or the woman who flounders in the water? Because I have energy and will, strongly developed by exercise, I am neither fussy nor flurried. I know exactly what must be done, and I do it; and when a life is saved by my means, I wonder why such a noise is made about what seemed so little for me to do.

Take another condition—the quickness of thought, the alertness of conception—which has all to do with self-preservation. Because I am a fair trapeze performer, or accustomed to ladder-work, the space lying under me, through which I might fall if I made a slip, has no apparent danger for me. I may have fallen once and been contused. But by practice I know how to fall—for how to tumble is an art, one carefully studied by fire-saving corps in the large cities. I am on a platform with a crowd. The timbers break and down I go. Instantly I appreciate the situation. As I fall I know what I am about, and arrange my body, prepared for all

contingencies. Guides in Switzerland, accustomed to falling and sliding, bring into play firstly their physical courage, and secondly their well-trained bodies. What higher incentives can there be for perfection of physical culture than the possibilities of passing through certain ordeals unscathed? Self-preservation is held to be the first of human rights. Perhaps before it comes the noblest of all instincts—that of saving a fellow-creature from death.

CHAPTER IX.

EFFECTS OF CARELESS EXERCISE—DEFORMITIES.

Differences in the length of limbs—The left leg generally the stronger—Right-handed men increase the power of the left leg—The foot—The balance struck—A lop-sided athlete—Exaggerations of form—Cultivation of deformity—The trapeze performer—The cyclist—Getting a set form—Overwork in one direction—The fencer—The rider—The care to be taken of the vertebral column—Use of head-weights—Baseball pitchers—The Esquimaux in his carak.

IN the *Journal of Anatomy and Physiology*, Dr. Garson makes this statement, that by the actual measure of the skeletons of seventy persons, "ten per cent. showed right and left limbs of equal length, and of these only two cases in which the femur and tibia of one side corresponded respectively to the femur and tibia of the other. In 35.8 per cent. the right limb was longer than the left, the average preponderance of the former over the latter in these cases being 3.3 per cent."

From these data, with many other measurements, it looks as if the left leg generally is longer than the right one, but the difference between the limbs is greater in the average when it is the longer than when the right is the larger. To show that there is unequal development, if 200 pairs of men's shoes are carefully measured, 35 per cent. of these shoes would show that the foot was

about the same size. In 44 per cent. the left foot would be the longer. In 21 per cent. it would be the right one. If women's shoes are measured and compared as to difference of relative size of feet, the left foot is frequently the smaller. This would arise from the fact that women are not as active as men.

What deductions are to be made from this? It is that man being right-handed, and using that side of his body the most, nature, by an act of great judgment, prevents the overgrowth of that side by forcing the left half of the man to do its proportion of work. Then follows the rule that we can make no isolated movement. If we apparently work one set of muscles, others, even those far distant, must respond. If not for this, we should be lop-sided.

The right-handed movement, being more common, seeks for its balance. We could not strike a heavy blow without something to rely upon to hold us up in a certain measure. The blow might be misspent, or wrong in direction and useless. It might by its own force carry us off our feet. If, as in boxing, we reverse matters and lead off from the left—which is the true weapon of offence—the right leg steadies us. The blacksmith wields his hammer with his right hand and steadies himself with the left leg.

Generally the left leg is the stronger, as men usually are right-handed; but if they are left-handed, in order to gain balance, the opposite leg gets up the additional power. This is the reason why we put the left foot in

the stirrup, though a left-handed soldier would take his seat with greater alacrity did he use his right foot.

Infantry starts off with the left foot, and in working the bicycle, almost always, if conditions are the same, we take the left pedal to start the movement and we mount with the left foot. Those who have made a careful study of the left foot, declare that it has more skill of movement than the right one. The left leg and the foot have certainly acquired additional strength, and the stimulant has improved the possibilities of the foot.

If you watch a skater, his nice cutting and flourishing depend rather on his left than his right foot. When a man dances, his left foot seems to be better under control, but women dance equally well with both feet. A leading authority states that a rope-dancer always places more reliance on the left leg, excepting when he or she happens to be left-handed, then the right foot and leg do most of the work.

With the mental effects of this prevalence of a right-hand initial movement and an unconscious response from the left, I have nothing to do. It is said, following up the idea, that men prefer walking in a circle from left to right, and this rule is carried out in the tracks for athletic sports where the direction is the same. In bicycle races it is very rare not to circle to the left, and the supposable reason is, that the first man being right-handed, as is the majority, went that way.

I may present this as an instance of the mental effect or tendency:

A little friend struggling with his bicycle made his worst falls when working away in the usual direction. Asking if he might take the other direction—to the right—he did so, and got along fairly well, and was not unhorsed. Some time afterward, I found out that he was left-handed and had to rely more on his right than on his left leg.

This whole subject is a curious one, but where the real interest of it lies, is in its physiological consideration.

Always working up to the idea of the man who is to be perfectly developed, it would never do for us to have a lop-sided athlete or a man who was strong on one side and not strong on the other. The natural tendency to make more muscle on one side than the other, we can hardly ever entirely prevent. As I rise in the morning, I do most of my work with my right hand if I am right-handed. It may begin when I take my bath, my shave, eat my breakfast, cut my bread, butter it, sip my coffee, and when I write or when I amuse myself—as at billiards or ten-pins, or anything calling on the work of my hands.

If I cannot help, then, this right hand, or right arm, or right side development, I have at least the satisfaction of knowing that nature is bringing about something of an equilibrium on the left side of me. What I am to care most for is to prevent exaggerations of form. I must not help directly toward the establishment of any physical deformities. The perfect man would be an ambidexter. To prove this self-evident fact, no argument

is necessary. The loss of a hand or of an arm forces a man to transfer his work from one side to the other, and it is wonderful to see how soon, through necessity, a left hand acquires all the cunning of the right.

We find that nature gives to the feet the same delicate manipulative functions as the hands, only civilization declines monkey-like imitations. Without being obliged to do it, but only because the savage finds it more convenient, he picks up the smallest object with his toes. In the highest degree the toe and foot "dexterity" is found in artists who, born without arms, paint creditable pictures with their toes.

Natural inclinations toward physical eccentricities, which are not visible, may be made in time to take the shape of exaggerations or real physical deformities. Such may be cultivated, and nowhere else so unfortunately as in the gymnasium; that is to say, when work is done without intelligent supervision.

Lagrange presents in a somewhat distressing manner many cases of deformity produced by exercise. Let us understand what the author means by a "deformity." The definition of "to deform" is to make anything ill-shaped and displeasing to the eye. Though the supposition might be that deformity cannot exist without disease, M. Lagrange does not mean that; he rather looks on it as an æsthetic sense.

If I am an artist and want a model, I may not incline toward taking either a pugilist or a coal-heaver to sit for me, unless I wanted to draw a fistic fight or a scene of

laborious toil. If we look at the work of the Greek when he shows us the winners of the Olympian games, these men of marble represent the absolute perfection of human form. M. Lagrange asks:

“Could we ever make a statue of a demi-god if we took for a model a trapeze performer?”

The next time a clever trapeze performer stands in his tights, you cannot but help seeing that he is built from the waist up, not from the waist down. He is exaggerated in form. The balance of vigor is all above, and nothing below. The form of the triangle, to hold within its three lines, the man, has the apex downward. That of the woman is the reverse. The apex of her triangle is her head. If the trapeze man were put in the triangle, the lines would hardly hold him. I should not want to sketch him, save for study, but not for art's sake.

Look at the trapeze man, not as would an artist, but as one inquiring after physiological facts. His back is good in breadth, but it is rounded. He has been hanging so long on his bar that he has absolutely pulled out of shape its muscular growth. He has prevented its development. If he had too much muscle on his back, its presence would have interfered with his gyrations.

The end and aim of life has been the trapeze, and he may be the crack trapeze performer, but he is by no means a well-built man. More than that, he is not put up straight. There is too much dorsal curvature. As you pick your trapeze man to pieces, you might find that his

front developments are not as nice as you would have expected. The arms, the shoulders are superb. One might say, then, that to have such arms, "to trapeze" has not been to live in vain.

Not so long ago, seeing a man put on his flannels for exercise at the gymnasium, I said, without any claim to infallibility :

"That man has over-bicycled."

"I do not know exactly if he has over-bicycled himself," said the intelligent superintendent of the gymnasium, "but he has won several events. He is all nice enough from the waist down, but next to nothing from the hips to the top of his head."

I had never seen such an exaggeration before. There was the ugly curvature acquired by the clutch at the handle of the machine, a restricted muscular development of the shoulders and of the upper arm, but the legs and thighs were uncommonly good. All the power of this man was below his waist. He was agile enough. I saw him throw a clever back-spring, and could not help but notice how the propulsion came as it should from below, but that aid which arms and back-muscles should give to help the general movement were quite wanting. While I was looking, the person in charge said :

"He is defective in wind, and has no staying power. He is here to get what he lacks, and I have said to him, 'Sell your wheel.'"

My reply to the superintendent was :

"And capital advice it is."

There is a physiological mechanism which tends to render an often-repeated attitude permanent. Sticking, then, to my special apparatus in a gymnasium—working that and nothing else—brings about deformity through abuse. Too much work at the parallel bars gives a positive forward thrust to the body, and is retained. There are forward curvatures just as ugly as the reversed one. Relief comes from outside work, where there may be no apparatus.

With fencers, who do nothing else but use the foil, there is enormous development of the right arm and shoulders and equal growth of the left leg and foot, but nature can only do just so much. The left shoulder, which has been left in the cold, has no development, and real deformity exists in the working right side and shoulder, which are lowered. Why is this? Because the position assumed necessitates the forward stoop to the right side. There is a forced curvature.

Young people who are not over strong, and who take to fencing at too early an age, show unmistakably this right-sided droop. The lunge in fencing may, at the instant of its delivery, put the man on a straight line as he delivers the point, but a man does not lunge all the time. The attack is limited, the defence more constant; and, as an able *maître d'arme* said to his pupils:

“Though appearances are nice to look at, learn for actual work how to crouch. You must make a bow of yourself, so as to launch your arrow with lightning speed when the time comes.”

I do not know how far a man who fences with a drooping shoulder is physically hurt; maybe so little, that it is not worth mentioning, but still, as far as form goes, it is something to be avoided. Men who ride professionally, as cow-boys, certainly have concave legs, because they must mould their limbs so as to cling to the body of the horse. Horses which pull at the bit induce curvature. The modern school of equestrians is, however, opposed to bit-hauling, and so the horseman of to-day ought to have a fair back. A model of form, without exaggeration, is a cavalry officer on his horse. When he gets off his mount, if he has lived a life in the saddle, his legs are the worst part of him. These three causes M. Lagrange lays down as producing unfortunate conditions:

“(1) Concentration of muscular effort in a very localized region, the other parts of the body not sharing in the work.

“(2) Necessity of maintaining during the exercise an attitude in which the axis of the body deviates from its normal direction.

“(3) Frequent and prolonged performances of movements which man does not naturally practice, and to which his conformation is not adapted.”

The first cause of deformity might have fencing as its example; the second, the over-use of the trapeze or parallel bars, and the third finds its application in the tug-of-war. Regular form, not here nor there, but all over the body, should be the object of the teacher of gymnastic exercise.

I think that a very simple rule for general guidance is to remember that the vertebral column is the axis of the body, and that by overwork of any muscles in one direction more than another, you can throw it out of line. The anatomist who understands the character of this spinal column, its wonderful flexibility, will tell you that it is impossible to have any over-development which is local, that does not bend this great spring of the back. If you give it a wrong set it may become a fixed and permanent curve, and it will grow in that one direction and no other way. Of course I mean only a slight curvature, and that no appreciable harm can come from it, but it is an ugly thing to see, and then certainly it precludes perfect flexibility. It may bend in one direction best and not easily in another.

Stooping comes equally from no work at all. The lad at school or the girl over her sewing, without sufficient play, have their backs bent. Workingmen who ply certain crafts have crooked backs. The watch-mender has a poor back. Tailors are always round-backed. It can be seen, then, how without severe work these accidents occur. The cure for the curved backs in children is best brought about by gymnastic work. The stoop has come as much as anything else from the want of harmonious action on the part of the muscles of the back.

The same twist has been brought about, because of over-exercise, certain muscles having been taxed to their utmost, while others have been rejected.

Loads on the heads for children are admirable as pre-

ventives for inclination to curvature. The only thing to be remembered is that loads must be light. It is not the weight that does as much good as the balancing action which is called into play.

I have seen a little girl with a wretched stoop perfectly straightened by means of a demijohn which, uncorked, held not more than four pounds weight of water. She had to carry it a certain distance without spilling it. If it fell she got wet and received no reward. Very soon she acquired automatically the balancing powers. She straightened out in two weeks, and from an ugly shambling gait, she learned of her own accord to step out straight with nice action.

Heavy weight on a man's or a woman's head acts in a detrimental manner. The Italian woman who "totes" the tourist's trunk, though she does the work cleverly for the time, with age will have a bent back. Something must give; the ribs go first, they tend to close, then they pull as girders on the main column, which is the back-bone. The spine then must yield.

The opportunity was given me to take the measure of three pitchers who have gained reputations in baseball. One of these men had "played ball" during three years, taking very little rest. I considered this man as a type of the first-class pitcher, as a right-handed man. Exaggerations of form were barely visible on his right side. The muscular development of both arms was about the same. I could not see that there was any lowering of the right shoulder. The muscles of the waist struck me as

being enormous as to size. The marked increase was in the left leg, in the muscles of the calf, and the thigh. The man's form was, however, to be described as normal. He was credited with being a capital all-around man, capable of taking any part in the game.

Another pitcher who had been pitching for a less time showed a more marked difference of form. His right shoulder was lower than his left one. When stripped, this lowering was quite visible. The muscles of his whole right side were wonderfully developed. In standing he had a forward stoop. Watching him, when in a match, I think I noticed that when he delivered the ball, he threw his body more forward than do most pitchers. He had not the bulk nor the build of the first man, and could not, probably, throw as much of his arm-weight into the ball, but by general accord it was believed that his balls had the greater speed. The left leg had rather more development than the right.

A third man with a left-hand delivery had not been at work as long as the other two. He showed distinctly an increase in size of the right leg. I am not to suppose, then, that pitching at baseball engenders any serious disturbances of form. Though the work of the pitcher is tremendous, the short intervals of time between deliveries allow him to recuperate his powers. When in perfect condition, there is no such thing as a good man giving balls with diminished speed at the end of a game. The balls may be less effective because not so well directed, but the power does not wane. As has been

before cited, the last blow of the boxer is likely to be just as powerful as the first. During the intervals of rest between the rounds, the muscular force has returned with amazing rapidity.

Nothing was appreciable in the form of batters or fielders. The all-around qualities of an efficient nine take away possibilities of any exaggerated or local muscular development. I may remark, however, that although these references to pitchers were derived from three men of national reputation in the field of baseball, in order to present reliable data, many more observations would be necessary.

The most notable deformity I know of is found in the Esquimaux, who paddle in their skin boats. Their development from waist to shoulders is superb; from waist to feet, they have no more strength than have children. They can walk, but cannot run.

CHAPTER X.

TRAINING.

Different applications of the term—The jockey—Consideration of human peculiarities—Time in training—When to stop—Food, clothing, air, bathing, repose—The human machine and its many requirements—The sustaining power—The appetite of the man at work—Privation—The Esquimaux—Melting out the fat—Organic exhaustion.

IN the use of this term, it must be understood that “training” does not always mean the endeavor to make the man physically perfect. Men who dive for pearls on the Indian coast work only to improve a capacity for retaining their breath. If a jockey is 10 or 20 pounds too heavy he trains down, so as to get rid of the excess of weight. The jockey has not improved his physical condition. On the contrary, he has lessened his general powers.

I have cited as nearest to perfection the “all-around man,” who is good for all things. I also brought forward the peculiarities of the individual who from make, build, or some cause which escapes us, is better adapted for one kind of work than another. We train, then, for the accomplishment of certain things. The element of time can hardly be disregarded, and we must try to bring up a man to his highest efficiency in the shortest interval. We want certain organs to undergo modifi-

cations, for we are to expect the possibilities of higher speed, increasing power, and greater staying abilities. We force, as it were, Nature to exert herself to her utmost. We are not to go beyond what is normal, but still trainers know, do what they may, that this highest degree of human efficiency is never a lasting one. The time will come when the man under their care is at his very best—"ripe" we might call it.

This period of perfection may be long or short. It is generally short. To keep in condition requires constant work. Stop exercise, and condition is lost. Work alone, however, is not sufficient. The man who is under training is destroying and rebuilding, and rebuilding and destroying his own edifice. There is a certain time when it is supposable that not a particle of the man as he existed nine years before, is present to-day. When an athlete then goes into training, the atoms of himself are always changing. If he is eliminating such things as may be opposed to the perfecting of his muscular development, he must be at the same time storing up those which are of special advantage to him. As his new structure rises through the destruction of the old, he is to build himself up with choicer materials. To provide the man with these much-desired elements, we give him carefully selected food. We bring the flesh of the man into a healthy condition by clothing him properly; and lastly, we provide him with plenty of pure air, and we are careful that he should have the requisite amount of sleep.

We feed him so that there shall be no waste of tissue. We call on nothing likely to diminish his powers through indigestion. We make him bathe, so as to have all the pores of his skin open, for we know that to clog his cuticle would be to prevent his getting rid in a natural way of such substances as are hurtful to him. We do not want him to fatten up, hence we limit his starchy food. We want no stimulants, and we give him little, if any, alcohol in the fluid he drinks. We make him exercise in the open air if the season permits of it. He must have good air. The room the man sleeps in must have perfect ventilation. The necessity for constant vigilance in order that a man may be brought up to the highest physical condition all trainers know about. A mother with her infant ought not to be more solicitous about the nourishing of her baby, than a trainer as to the food of the prize-fighter under his charge. A statement of this character seems to be far-fetched, but it really is not in the least out of the way.

Take the thoroughly-trained man, and what have you got there? A mechanism which is strengthened, which has a quicker and better movement, which can work during a long period. But how was this mechanism created? At the expense of certain substances in the body, which having been assimilated, have now almost disappeared. Everything has gone to improve bone and muscle. Here is a machine. It moves splendidly, only it no longer carries its coal with it. This ought to explain thoroughly that necessity the man in training

has for the proper kind of food. He has worked out, or is working out, the sustaining power within him. How otherwise could he keep up, if not by constant renewals from the outside? This may be said to be the most commonplace of statements and relating to all questions of human sustenance; but the food given the athlete, he takes and must take in larger quantity than the man who does no work. A man, like a horse, if off his feed, is lost. I should be afraid to state outside of the profession, the enormous eating capacity of some men when in training. It far exceeded any dietary regulations I have ever seen printed in the books. It had to be regulated as to quality. Restricting the quantity would have been to ruin not a few of the subjects. I never have seen cases of collapse more sudden, than when men under training have had their provisions cut down by a theorist.

I never have considered such heavy devourers of food as gluttons. Slightly scaling down such demands, using discrimination as to the kind of food, and administering it at short intervals, I never have experienced any serious troubles. I have invariably made a distinction between the power a man has of resisting muscular exertion and the bearing of privations. An Esquimaux, because used to it, will stand cold and hunger better perhaps than an athlete.

In this consideration of the training of the man, I return to the question of fat, for if my argument is good for anything, it must be hurtful to try and "melt out" or work off all the fat in the man.

There is nothing in training to be dreaded more than organic exhaustion. I have made the statement that break-downs come from poor physical conditions. Here, at least, the effects are at once perceptible. It might have been more or less difficult to bring the man around. It was very much worse when organic exhaustion set slowly in. This is undiscoverable at the beginning, for bad effects have had so long their sway as to be beyond the power of curing.

CHAPTER XI.

FAT.

False theories—The disadvantages of too much fat—Old ideas—

Fat a reserve fund—Its use—We build with fat—How men in training may take on fat—The distressed trainer—Fat an integral part of our organic structure—Japanese wrestlers—Fat offering differing powers of resistance—Where it is not wanted—Its presence in the abdomen—Pugilists—When fat interferes—No fat in the lungs—Over-production of carbonic gas—The sprinter—Inspiration and respiration—Methods to prevent obesity—The Schweninger cure—The Aertel method—How much fat is normal—Height in relation to weight—When is a person stout—Discrimination as to kind of food—What makes fat—The pig—Starchy and saccharine substances make fat—Food in youth—Inactivity and obesity—Banting—The carbo-hydrates—Table of weights—Dr. S. W. Mitchell's comparison of English and Americans—Massage—The blood-supply—The danger of using "anti-fats"—The change for the better in training—How to impair a man's vitality.

I HAVE said that exercise decreases the quantity of fat, and that this diminution is what we want to bring about, but I do not mean to advance the idea that we should work away on the human body until fat disappeared entirely. In studying this subject, I find among many excellent authorities, a disposition to make distinctions of fat according to location. "Run," writes some one, "that is the way to remove internal fat," and I am to suppose that reference is made to the fat in the

abdominal regions. Nothing is more true than that a man with a distended paunch cannot run. Old methods of training, founded on ignorance, advanced the idea that the perfectly trained man ought not to have any fat at all. You may still see in newspaper reports, describing athletic events, "When Smith stripped there was not an ounce of fat to be seen on his whole body." Nothing can be more absurd than a statement of this kind. Maclaren presents the subject of fat in a sensible manner; and he writes that the getting rid of "all fat" was an "old, venerated theory," which when carried out did a great deal of harm.

That the elimination of the excess of fat facilitates work, is not to be questioned. If I waddle with twenty-five pounds more fat than I should have normally, I carry about with me so much additional weight. I handicap myself, but that is not the only thing at fault brought about by this extra adipose tissue.

If I try to walk fast, having more work to do in lugging around this extra weight, I must use more exertion, *i. e.*, I can only get speed by increasing my draught and burning up additional fuel. There is my coal-bin of human fat. I burn that up, I get red-hot. What is worse, having increased my blood temperature, the internal fluids remain longer hot, for the simple reason that I am like a steam-pipe covered with felting. I cannot cool off, because the fat prevents normal or gradual change of temperature.

We have no right to abuse fat, however. Why did

nature put it there at all, if it were a hurtful substance? It is so easy to find fault with things, the uses of which we know nothing about. Fat is a reserve fund, something for us to draw upon. It may be as bullion in a bank, not negotiable in the street because of its being too bulky to handle, but still it can be converted into currency. If a man started as lean as a museum freak, and I had to train him, I should certainly try to fatten him at first. I should want to know as soon as I could if there was anything to build on. As to fat itself in the man who is under training, I, with many others, know of individuals intrusted to our care, who invariably increase in bulk when put to work. They "trained fat." It would be super-arrogation for me to insist that the increase was due to improvement in the quality of their flesh, their muscles, or their bones. This I do not believe. It must have been due to the taking on of a little more fat.

A year ago a gentleman, a leading member of an athletic club, who was theoretically and practically proficient, tried his hand at training a friend, and very intelligently he did it up to a certain point, when he came to me in hot haste. This is what he said:

"Do what I can, Mr. J—— is training up and not down. He turns the scale eight pounds heavier this week than he did when he began three weeks ago."

"Does he show improvement enough to set off this increase of weight?" I asked.

"Certainly he does. Never was so eager for work,

and he is behaving splendid ; but, oh, that eight pounds ! I can't cut down his work, or lessen his diet."

"Where does he show this increase of bulk?"

"Nowhere. Measures are increasing everywhere. I can't sweat him with Turkish baths—but eight pounds—oh, it's dreadful!"

"I will tell you what you do," I said. "Let him severely alone. If he breathes clear and full, I would not bother. It's a natural case of increasing weight, and it is all right. Change your method with your man, and you will alter his condition and not to his advantage."

My advice, considered at least consoling, was, I am pleased to say, adhered to. The morning before the event the young representative of the club was a full twelve and a half pounds heavier than at the beginning of his training. He was a chunky, sturdily-built man, and training had not reduced his full, round cheeks. There was a pleasant smile of contentment on his face. He felt good, good all over. I thought him just a little fatter than I would have liked him to be. He was pitted against the champion of another club, who was rather gaunt below the waist-band, with hollow cheeks. Not to extend this incident, our fat young man, in the gamiest long distance race I ever saw (non-professional), came in just a foot and two inches ahead ; of the two men the stout young man seemed to be the least used up.

The best authority I know of calls fat in particular individuals "integral parts of their organic structure. It is a constitutional tissue, and has, so to speak, freedom

among the anatomical elements which accompany it." I do not hanker for stout-built men, save, of course, for heavy muscular work, where bulk and fat ought to be present. It is a false idea that much fat prevents muscular possibilities. If that were the case, Japanese wrestlers would not exist.

Fat—no matter where it is found in excess in the human system—can be gotten rid of. It offers, however, peculiar aspects as to resistance. It may be deposited largely in one part of the body and not in another. It must not be allowed to be present at all in some portions of the system, as in the heart. Generally it comes rapidly, and in apparent excess in the region of the abdomen. In exercise, there is the place where it seems to be most persistent. I have known pugilists who, after a long rest, have found all their trouble in getting proper "form" below the belt.

Too much fat must interfere, not as much with the respiratory organs, as with the quality of the products of combustion which leaves the system. In describing that asphyxiation arising from sudden exercise, I have stated that the causes for it were complex. There is no fat in the lungs, but in the stomach. The air may burn that fat in quantity, and so give an excess of carbonic acid, and then wind-troubles come. When you are rid of that fat—some of it, at least—the man gets his wind and keeps his wind better, not because fat is a mechanical, but a real chemical obstruction. With too much fat the man is poisoning his own exhalations.

Take a sprinter, and his inspirations may be as high as forty-four a minute, while in repose they ought never to be beyond twenty. Forty-four breathings in the sixty seconds! That is one inspiration and respiration—eighty-eight movements—each accomplished in a fraction of a second.

I have written about “adaptation.” Nature permits, by means of habit and use, of our doing many wonderful things, but never for very long. What would be a terrible strain on the individual unaccustomed to abnormal breathings, experts bear without trouble. As this matter of fat should be thoroughly understood, for its further elucidation I present the advantages derived from eliminating fat, so that the comfort of the individual can be carried out.

The fat man has rarely any desire to figure in the gymnasium or on the track. All he wants is to be able to move about comfortably, not be stared at in the streets, or he may long for such reduction in form as to enable him to diminish his tailor’s bill. The latest theory in regard to diminishing the quantity of fat is due to Dr. Schweninger. The credit of the system belongs properly to Professor Aertel. With the peculiarities of German nomenclature, the Schweninger method is called “cure”; the idea being that morbid obesity is the disease.

A normal man—not an athlete—is supposed to carry about with him one-twentieth of his weight in fat. A normal woman will be beautiful with about one-fifteenth of fat. From the accurate anthropometric measure-

ments kept by insurance actuaries, a man of five feet seven at the age of thirty ought to weigh from one hundred and forty to one hundred and fifty pounds. A woman of five feet two ought to weigh one hundred and twelve pounds. The accepted addition for each inch in height is five pounds, and so a six-footer at thirty ought to weigh from one hundred and sixty-five to one hundred and seventy-five pounds. If there is a weight of fifteen pounds added, then there is inclination to stoutness, and it might be said "that those men or women are fat." But such additions by no means increase the risk of the insurance. With us, our examining doctors rather incline to insure stout or fat people than lean ones, and for this good reason: If illness comes, stout persons with fat on them stand the strain of disease better than the thin ones.

As fat comes from food, and we must eat to live, let us care less for the quantity and more for the quality of the food we consume. If by eating a certain kind of food I take only an additional quarter of an ounce of fat per diem, do not get rid of it, but keep on storing the fat; in ten years' of accumulation of fat I shall add not less than fifty-seven pounds to my weight.

When I fatten a pig, from whence come the peculiar substances which make this fat? Such matters have been carefully studied. If I fed pure fat to the pig, I would not produce fat. Fat is not made from fat. It comes from the animal having been fed on starchy and saccharine substances. I fatten him on corn.

When we are young, all kinds of alimentary substances are taken with good results. We want certain food for the bones, the muscles, and the flesh. There can hardly be anything presented in excess. We use it all up in building ourselves up.

When we stop growing, we do not want as much of certain kinds of food. Then we ought to exercise selection, and particularly so if we lead a sedentary kind of life. Inactivity leads directly to obesity. It is brought about by excess of food and too free use of beverages. Sometimes, being an inherited tendency, we have to use great precautions in order to prevent it. Although William Banting has been more or less ridiculed of late because "he was not scientific," still, in many cases, his system was shown efficient up to a certain point. I am not so positive as are those who are opposed to it, that it brought about any dangerous consequences. It might have been difficult of application. In fact, save by exercise, I know of no method of "thinning down" which is not irksome.

In certain cases I must admit that the Banting method might have induced heart-feebleness, but I do not see why lung disease or dropsy necessarily followed the London undertaker's method. All the systems—whether of Banting, Ebstein, Aertel, or Schweninger (the two latter being the same)—depend on a reduction in the consumption of the carbo-hydrates in food, and by the carbo-hydrates is meant starchy food; for, both theoretically and practically, it is undoubtedly starchy

food that makes fat, and if indulged in to excess without exercise, obesity follows.

What the Aertel-Schweninger method tries to do is, to give such food or kinds of food which they believe will remove the fat if it be made. This is all nice enough in theory, but the results do not seem positive. What these professors insist upon is exercise, and in the Schweninger rules, mountain-heights are to be scaled. Generally presented, the diet of the Schweninger or Aertel cure is, to eat lean meat (roasted or boiled), green vegetables, and not more than six ounces of bread per diem, and during the twenty-four hours, sixteen ounces of fluids are to be used, and not a drop of beer is permissible. In satisfying thirst with tea, coffee, or milk, never must more than five ounces of fluid be taken at a meal. To walk three or four hours a day is obligatory, and to mount a staircase once or twice a day is part of the work.

About six weeks to two months brings some relief from obesity. There can be no question, since, in addition to selection of food, exercise enters into the cure, a patient would be benefited by the Schweninger system.

I am a little doubtful whether this cure is of any benefit for heart disease.

In Banting's book many useful references may be found as to the proportion of stature and weight desirable from insurance statistics. According to these measurements of height and weight:

A man of 5 feet 1 should weigh 120 pounds.

A	"	5	"	2	"	126	"
A	"	5	"	3	"	133	"
A	"	5	"	4	"	136	"
A	"	5	"	5	"	142	"
A	"	5	"	6	"	145	"
A	"	5	"	7	"	148	"
A	"	5	"	8	"	155	"
A	"	5	"	9	"	162	"
A	"	5	"	10	"	169	"
A	"	5	"	11	"	174	"
A	"	6	"	0	"	178	"

It will be seen that five pounds to the inch is not always a constant factor. As to Banting's own experiences, he states that on August 26, 1862, he weighed two hundred pounds. By following out his system, on the 26th of September, he had lost forty-six pounds. Let me take the opposite condition: A man or a woman is thin and wishes to take on flesh and fat. My best authority for such matter is that presented by Dr. S. Weir Mitchell. He states that "the quantity of fat which is healthy for individuals varies with the sex, the climate, the habits, the season, the time of life, the race, and the breed." This distinguished authority shows that women "may lose or acquire large amounts of adipose matter without any corresponding loss or gain in vigor."

It looks as if were we to weigh forty English men and women, the Britons would lower the scales if the same

number of Americans were pitted against them, but that does not mean that we have reduced our flesh by exercise. It is probable that the English exercise on an average more than we do. Character, food, and beer-drinking increase weight, but then, climate has much to do with fat-making.

To fatten, then, artificially, is to feed carefully; to give additional rest to the person, but not to neglect muscular growth. How can muscular force be brought about and a patient remain in repose? By massage. This is a method of stimulating the muscles by friction. Before this it has been stated that there can be no normal nutrition of the body without muscular movements. For health we want currents of life to flow through the body. "The lessened blood-supply is a result of diminished functional movement, and we need to create a constant demand in the inactive parts. Every active muscle is practically a throbbing heart, squeezing its vessels empty while in motion, and relaxing so as to allow them to fill anew. To artificially work the muscles to bring about a healthy stimulation, to feed the body for languid and invalid patients, is to restore life."

What do we see, then? We have studied the methods of reducing fat. Diet will account for so much and exercise for a good deal more. If we want to make fat, we feed in a certain way, and we exercise the muscles artificially. It is not at once perceptible how much this exercise—the working of the muscle—has to do with health.

The purposes of this book on training would not fulfil their proper function if a vehement protest were not made directed toward those wicked and poisonous substances known as "anti-fats." Any one who buys such nostrums runs the risk of life. It is impossible, without certain precautions, to change one's condition. There is but one natural way to do it : by means of careful exercise, combined with selection of food. If a man or woman is over thirty, even this effort to reduce weight should never be carried to excess. It is always wiser to consult a physician.

It is the ignorance of the public which renders the sale of such quack medicines possible. Every such compound should be carefully analyzed before permission is granted for its sale. If I wanted to thin a man down rapidly I could do so, by means of acid solutions or by the use of caustic substances. I might induce inflammation of the bowels and so thin down a man, until I had him reduced to a skeleton and ready for his coffin.

In treating of the subject of the reduction of fat, pains has been taken to present the subject in its fullest light. There has been nothing relating to training, which has been more overlooked than this question of fat, and misstatements in regard to it are many.

Not to understand the common sense of the subject is to fail in bringing up men to their utmost degree of efficiency. To train down, to take all the sap out of a man, is more frequent than is supposed. Fifteen years ago, I rarely went to see an athletic event that I did not

notice two or three men who had been brought down too low. In a pretty wide experience, I may have seen a man worked "too fine" who won, and I have said, "Well, an exception proves the rule." But then when I have followed the performances of this particular man for a year or more, I have found that I had seen him win only once, and never after that had the palm of victory been his. He had lost his power. He never had been able to regain it. It seems to me to be little short of wickedness to impair a man's vitality, as was once the habit. To-day, I rarely notice such worn-out men, and it is because better sense prevails.

I have occasionally entered protests about the light weights of men when looking over boating crews, and studying the totals of weight before the men went into training and when stripped for the pull. I think an inclination to fine down men still exists in the United States. I notice, however, that in the English Universities this diminution of original weights in training is only carried out to a moderate degree. Improved methods of diet keep a man to-day in better condition. Phenomenal work never is possible when the man himself is not normal, and that covers the whole subject, as far as I understand it.

CHAPTER XII.

FOOD.

Food requirements vary with conditions—The Guacho—Why we use meat—The Coolie diet—Quality of food—Water in food—Concentrated food—What a man eats as to its weight—The hydro-carbons—The nitrogenous food—What makes muscle, what fat—The workman's power measured in tons—Demand for food—Quality, not quantity—The cooking of food—Regimen of the man in training—Why pork is not used—When to eat—Why digestion stops—The tired woman—Do no work on an empty stomach—Variety of food—Bolt-ing—Quantity of food—Maclaren—The ravenous man—Use of beer, wine, or alcoholic fluids—Tea, coffee, chocolate, cocoa—Boils—Quantity of fluid—Restrictions—A dried-up man—Method of assuaging thirst—Why ice-water is hurtful—Cramps—Time of drinking—Adulterated and aerated drinks—Ginger-ale—English methods with use of beer—Wine—Bread and fat making—The starch in bread—Why bread should be used stale and toasted—Doughy bread—Greasy bread—Rice—Oatmeal—The Scotch—Advantage of the frequent cooking of starchy food—Potatoes—Vegetables—Salads—Onions—Fruits—Poultry—Personal experience—Condiments—Changes in taste during training—Butter—Tobacco—Use of medicines—Bad effects of pills and purges—The trainer not a doctor—Blood-letting—Russian baths—The oarsman and the Turkish bath—Powder—A pretty skin—A clean skin—The use of water—The pores of the skin—Perspiration—What is in solution in perspiration—Use of soap—Hot and cold bathing—The cuticle—The sponge bath—Rubbing down—When to bathe.

FOOD requirements vary with human conditions. According to the expenditure taking place, so materials are

to be supplied in proportion to the waste. "Under exposure to hard labor, to high and low temperatures, consumption differs." The supply of food, then, should be so regulated as to meet all these requirements.

What we want to do with the man who is under training, is to furnish him with such food as will increase his muscular force, give him flesh-forming substances and diminish fat-creating aliments. I am rather doubtful if we gave a man under training a Guacho diet, that is, one of pure meat without an ounce of bread or vegetables, whether we would not produce within the man's economy a certain quantity of fat. What the man under heavy exercise does is to burn that fat quickly off so that there can be no surplusage of it. We must use meat, because experience shows us that meat, more quickly than anything else, gives quality to muscles. It is not to be supposed, however, that eaters of farinaceous compounds are not strong. There are Coolies of prodigious strength who have never eaten anything else but rice and butter.

The quantity of food consumed by the ordinary man at work is generally presented as weighing about 46 ounces. There is superabundance of water in these 46 ounces, because the food so dissolved in water is more readily digested and so bulk seems to be a necessity. If we were to take and dry these 46 ounces, they would be reduced to a small volume. Instead of 46 ounces, we would have about 13 ounces. Now we know that highly concentrated food is not readily assimilated.

Taking the various substances consumed—such as meat, eggs, milk, bread, sugar, vegetables, and the fats—we would get at something like the following divisions.

The workingman has used in the 24 hours: $4\frac{1}{2}$ oz. of meat, eggs or milk, or nitrogenous food; 3 oz. of fat (hydro-carbon); $14\frac{1}{2}$ oz. of bread, sugar, or vegetables containing starchy matter—the carbo-hydrates; 1 oz. of salt, as the components of lime, sodium, the phosphates, etc., etc.

Prison diet may be generally represented to consist of about 52 oz. of moist food, with a less proportion of meat.

For all general purposes, we divide food into the two categories of those which contain nitrogen and those which do not. In the human body, considered as a machine, nitrogenous food, such as exists in meat, eggs, or milk, goes directly to make the muscles, the flesh, and the bones. A perfect assorting process takes place within the system. By some marvellous power, nitrogenous substances are converted into the springs, levers, and couplings of the human mechanism. What the nitrogenous substances do is not less useful. They supply the coal which brings the steam up to its pressure. When we exercise, the non-nitrogenous elements are burnt.

There is generally great ignorance as to estimation of the actual work a man does. Dr. Parkes says that the average daily work of a man who labors in the open air is equivalent to lifting 250 to 350 tons a foot high. In

a heavy day's work he would exceed a lift of 400 tons. Take an ordinary twenty miles walk on a level country road, and you have called forth a force which would have lifted 353 tons a foot. If the road be up hill, it would be measured by 75 tons more.

Can it not then at once be understood what are the demands of the athlete who is going through hard work? Does any one imagine that a boating crew in training has a scales and measure brought in on the mess table, and that the coach acts as a dispensing apothecary? A mutton chop rare varies very much in size, its bulk having to do with the breed of sheep and the peculiar cut of the butcher. Within certain limits, quantity may not be looked at. It is quality above all things which is to be considered, and also the time when repasts are to be taken. As to preparation of food, the cook should have due notice given him of the requirements of those who eat. There has been a great hue and cry of late in regard to raw meat, and the dangers accruing from the transferring of contagion in the animal to the man who eats of that animal. Raw beefsteaks or too rare mutton chops are not easily digested. The strength-giving qualities are not as readily absorbed as when a chop or a steak is properly cooked, neither too rare nor too well done. Over-cooked meat is worse than none at all.

From a meat diet, all veal and pork are to be excluded. Veal is immature food, as is even lamb. Of course, the cooking of veal like that of green apples changes its

character, but in the best cooked veal or lamb, to get the same amount of nutrients, according to Professor Attwater, you have to eat more of them. A call is then made for increase of digestive power, and consequent loss of vital force. Pork is tabooed because it is indigestible, and contains less muscle-making ingredients than any other meat.

As to the time of eating, nature generally suggests that. Regularity is an important factor. A rule always to be followed, is not to eat too near the time of taking exercise, or too soon after it. Does it not stand to reason that having consumed a meal and then taking exercise, the digestive functions must be disturbed? One set of vital currents has its full head on, trying to assimilate the food, when another action diametrically opposed to it is called upon. Then digestion stops, and to the disadvantage of the stomach and the muscles. You are drowsy or feel lassitude after a meal, and for the good reason that the circulation is really being withdrawn from your brain to work in other parts of the body where its presence is required.

It is always bad to eat at once after a heavy pull. You have not waited until an equilibrium of forces has been brought about. The call you make has had too brief a notice. Take the extreme case of a woman who has over-walked, or over-shopped herself. She is just in time for dinner, but is too tired to eat, though she does try. She eats without appetite and her food is not digested. Had she waited a half hour, her system would

have been in equipoise. Then she would readily have accepted food. To work on an empty stomach is to commit a first-class foolishness. In the morning spin, I always advise taking some little thing to eat, if it be only biscuit or a bit of toast before work. Two or three mouthfuls often stop nausea, and that mean feeling which spoils a whole day.

I believe in variety of food. I would rather vary beef and mutton, giving a man one meal of beef, and another of mutton. I have found some men who, even in their senses, had an abhorrence for mutton, and I have thought they were not quite as good for being addicted to the one regimen of beef.

I despise bolting. When I have presided at such meals, partaken of by a boat's crew, I must confess to have given instructions to the cook that, once the repast had opened, not to hurry too much the sequence of the *menu*. I may have been laughed at, among well-bred gentlemen, as one not acquainted with decent manners; but I have said: "Gentlemen, pray do not bolt. I do not perceive that you use your knives in lieu of your forks, but you do not seem, some of you, to appreciate the use of your teeth. Mastication, perfect mastication, has much to do in the perfecting of muscle. Take your time. I do not mean to say you stuff, only you show immoderate haste. We are not pie-eaters bent on breaking the record."

Maclaren gives excellent advice as to the quantity of the solid food to be taken. It will vary "with habits

and conditions of life and occupation, and age, and temperament, and climate, and season, and time." I have never seen a man suffer from over-feeding when in training. Perhaps if a ravenous man were under my charge, and I had seen an inclination on his part to excess, I may have wanted to lessen somewhat the food supply, but I never saw a glutton. I do not think gluttony exists in an intelligent man. Appetites are large, but not beyond the call nature requires.

I am entirely opposed to beer, wine, or alcohol, in any shape or guise, excepting its use as a medicine. I may never have trained a man without having a bottle of brandy handy, but it was only uncorked when the race was over. I give tea, and only semi-occasionally coffee; and when I have served coffee, it has been weak. I am not an advocate of chocolate or cocoa. I think I can make fat, more fat than I want, by means of chocolate.

There is one thing that wrecks a man, and that is boils. With Maclaren, I am of the opinion that beer induces boils. In three instances, in teams of eight men, the only two men affected with boils had been beer-drinkers. That they did not have a drop of beer while I was working them, I am positive. The boils may have come from prior lager-beer drinking. How different are modern ideas from those of the past may be seen in the statement that twenty-five years ago a pugilist in training could not get along without at least eight pints of "old ale" per diem.

As to the question of how much water or tea a man may drink when in active training, that depends on the individual and the weather. When a man is in fine training, his exertions being minimized, he perspires less. The awkward dancer has his shirt-collar always limp. Not having gained mastery over his legs, he perspires all over. Nevertheless the athlete who is at his work is not in normal condition when he does not sweat. He must perspire, not to get rid of the water alone, which, as it evaporates on the surface of his body, prevents his over-heating himself, but the moisture carries off with it some of the solid products which may overcharge his system. He is getting rid of his surplus in the simplest way. "Why," asks Mr. Maclaren, "should there be restrictive laws on this subject of drinking?" There used to be some stupid fancy that a man in training should have plenty to eat and nothing, or next to nothing, to drink. Like food, it is only a question of when to drink.

After a hard pull, or a stiff run, the tongue is sometimes so dry that it rattles apparently in the mouth. The man has worked every drop of superfluous water out of his system. The very blood in his veins craves dilution. Then temperate use of water should only be allowed. A man can cleanse his mouth with water, and at once a great deal of it is naturally absorbed. Let ten minutes elapse and then several mouthfuls of water can be taken. In a quarter of an hour afterward the necessary water can be taken.

I am not an Englishman, and have no prejudices against ice-water under ordinary circumstances; but I cry, "beware of ice-water" to assuage extraordinary thirst, especially when you are red-hot after training. I have seen such cramps follow the douching the system with ice-water as to make a prime man utterly worthless for a week to come. I should say that water in summer, at not more than 55 degrees F., would always be cold enough. I believe that more lasting injuries are brought about by carelessness as to the time of drinking than by anything else. There are many rules of thumb as to the methods of drinking. Many books say only drink after eating, not during the meal. I consider this as having no scientific foundation to rest upon. I should not advise pouring down your tea or your coffee all at once, but take it during meals if you feel so inclined, but never take a drink of ice-water while you are in training.

I am chary as to the use of acidulated drinks, as lemonade, even if taken at rare intervals. There is a tendency among young men, who have been used to stimulants, to crave for aerated waters, and a very moderate employment of these waters I have not found hurtful; but ginger-ale, as a stimulant, I know from experience is hurtful. Tyros on the cinder track have often come to me, after sharp exercise, and have complained of nausea, and have begged for a bottle of ginger-ale. It seemed a simple thing to ask for, but I have declined permitting it, for the good reason that I

have known it to spoil a man, for a day or two, when he wanted just the next twenty-four or forty-eight hours to make him perfect. For symptoms of nervous exhaustion I have found tea to be the best of stimulants, and that tea taken warm, without sugar or milk.

The English system of training differs from the American one in the fact that the Oxford or Cambridge man will take a pint of beer for his dinner or supper, and some little wine. I should think that an Englishman, being more accustomed to beer, might feel the deprivation of it more than the American. Difference of temperament in the two races might account for its being advantageous at least to the Englishman. I believe, however, since English trainers have very much curtailed the quantity of beer, its value as a fluid-giving strength has been estimated at its proper worth. I know, too, that a great deal of care is taken as to the kind and quality of the beer consumed by the Cambridge crew. If ever I have given way in my opinions (and there is no rule without an exception), I have occasionally administered a wine-glass of sound red wine, but never sherry or port. In certain slight losses of tone, and looseness of bowels, I have found a small quantity of French wine to act as a corrective.

How bread shall be taken, in what form, is of importance in training. I want to be so thoroughly understood about fat-making, that I needs must rehearse this subject. Do what we please, unless we starve, we make fat. We want to make fat. Because we are always

creating it, that shows that nature craves for fat. But we do not want to put it on in layers. To clog the muscles with it, to enfold the bowels, to distend the abdomen with fat, is to ruin a man for an athlete. If we want fat, we would like it to go as fast as it comes. It is our store of coal. We are like a steamship employed for carrying the mail. This ship, because she is swifter than any other steamer, is the one selected. She must carry coal for the trip. She is not going to overburden herself with two or three times more coal than would suffice for that voyage. She only carries a quantity proportionate to the wants of a single voyage. Every pound more she carries would decrease her speed. That is nearly the condition of the man with his store of fat when exercising.

Bread, I do not care how you take it, contains starch or farinaceous matter. It would not be made of flour if it did not. All grain contains starch: wheat, 57 per cent.; rye, 64; oats, 60; Indian corn, 67; rice, as much as 88 per cent. The converting the starch into sugar takes place within the body, and this starch so changed becomes fat. Swallowed fat does not make fat. Hence, in feeding the man under training, we do not want to give him excess of the fat-producing aliments. In all the "cures" tending to prevent obesity, it is the diminishing of the farinaceous or non-nitrogenous food that the system depends on. When bread is stale, it is more readily digestible. Not that any change has taken place within the loaf, but because, having no longer its gluten

in a sticky condition, its crumb is more thoroughly masticated. When bread is toasted there is actually less starch, because, through roasting the bread, an absolute change of elements takes place. Of course this alteration is only at the surface, but the bread inside is more thoroughly dried, and therefore more easily divided by the teeth. All doughy bread, or carelessly made bread, with cakes, buns, and pies, should be expunged from the dietary of the man in training.

Fatty substances mixed with flour prevent rapid digestion. Whatever the man who is at work eats, he eats for a purpose. Whatever takes away from his vital force must be discarded. The principle ever to be remembered is that such food is the best for the man which gives him bone and muscle, and the power necessary to work it off with the least trouble. It is obvious that in selecting the ordinary farinaceous foods of civilization, the man in training would not stuff himself with rice-pudding, for the simple reason that starch in rice represents not less than eighty-eight per cent., while in wheat it is only fifty-seven. It is not always safe, however, to rely implicitly on percentages. Individual powers of digestion or assimilation act differently. I notice that a crack English trainer gives oatmeal gruel. I can find no possible fault with the build or courage of those who eat oatmeal. If oatmeal be that foundation on which a Scotchman builds, all I have to say is, that he has found an uncommonly good material. The richness of phosphate oatmeal contains, the potentiality it possesses as a bone-

maker, makes me rather incline to its use. I regret, then, never having tried it. I would not use it in quantity, but give it to men who crave additional food at their last meal.

There is something about preparing various kinds of farinaceous foods which should be borne in mind, and it is, that for certain purposes, the continuous cooking of them really improves their nutrient qualities. When they are thoroughly cooked or heated over, the starchy substances approach nearer to conversion into sugar, and the processes of digestion become both easier and shorter. In fact, the repeated cooking of farinaceous or starchy compounds, acts as if a digestive process were carried on outside of the human economy. This is the reason why toasted bread is recommended as a diet instead of bread as it has left the oven.

Potatoes I do not deem to be good food for those in training. Twenty per cent. of starch is not a great deal, but the potato makes fat very easily—too easily, in fact. With this exception, all other vegetables can be eaten. I even advocate their use. To make a discrimination between a cabbage and a green pea seems to be an act of hyper-criticism. Green peas, beans, or such legumes contain very much more farinaceous matter than parsnips or beets, but the quantity of common vegetable food a man under heavy exercise in training craves for is never large, and his wants in this direction should be satisfied. Oxford and Cambridge both give vegetables as a part of the day's fare, and salads are introduced for

supper. I would rather give a little salad with the mid-day meal. I advise particularly the use of a well-boiled onion at times. As a mild natural purgative there is nothing better. It may be noticed in studying former English training bills of fare that fruits are never mentioned. The nearest approach is "a gruel with raisins and currants," given, if required, at a supper ; but this supper is not recommended. I use fruits when in season and out of season. Stewed apples or stewed peaches are better than prunes. If ripe fruit is to be had, I give it in certain quantity. I am positive if fruit be used in moderation, there is general improvement of the system. I do not think that for a man hard at his work anything tastes more delightfully than **the half** of an apple, or a ripe peach. I have always considered that the cravings of nature were not to be overlooked. It is a call for exactly what was wanted.

I see no harm in using good poultry at times, but not too frequently. At the commencement of the period of training, when I have noticed a man not take his beef with the zest he should, I have started his hunger with poultry, but have never continued it. Certainly a man could not train on a breast of chicken.

I am a fair, but not a large, meat-eater, excepting when I have been under training. In my experiences, I was once in a situation where for three weeks the only meat I could eat was such as was covered with feathers. There was plenty of flying game, but no deer. I lived then on the game I shot, and I had hard work to

get enough of it. I must confess that considering the kind of food and the work I was doing, I fell off considerably in weight; that I did not care for much, but I found that my general physical condition was running down. I tired more readily, and was losing energy. The diet did not suit me. On another occasion, there being no butcher-shops within a thousand miles, nor four-footed game to kill, I was forced to subsist on a purely vegetable and farinaceous diet—canned vegetables and fruits, with hard-tack. I had plenty of hard work, and I bore the fatigue well. My weight diminished rather more than it would have done under a meat diet, but I was always fresh, and the stimulant to work was never on the decrease. I am not, however, prepared to state that changes of form due to the presence or absence of certain kinds of food invariably follow.

All stimulants, such as condiments, are to be shunned. The cook may dust the meat lightly with salt and pepper, but do not touch the castors, and do not use mustard. Condiments are incentives to poor appetites. If you are not hungry in a natural way, then you are not good for athletic exercises, and had better give them up. You neither want pickles, catsups, nor sauces. Hunger is that sauce which work should bring about. You certainly will be thirsty enough after your run or pull, and should never take anything which would tend to excite unnatural thirst. The use of sour compounds I have written about. In recommending salads, that



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comprehends the dressing, with a proper proportion of good oil, and as little vinegar as possible.

There are little things which show the peculiar conditions of the man, and changes which take place in tastes. I have sometimes noticed that at the beginning of a period of serious training a man has shown at first a craving for salt. A careful coach who watches his men should overlook nothing. Is it to be supposed that I had the salt-cellar suppressed? Not at all. The man had all the salt he wanted. In a few days his desire for salt in excess was gone. His system was crying for a good dose of sodium, and he took it, and satiety came. I have heard a trainer say:

“Mr. —, excuse me, but you won’t grow good muscle, or make your wind sound by putting so much butter on your toast. I wish you would take your bread dry.”

“What if it chokes me?” was the query.

I cannot, of course, enter into descriptions of the œsophagus of the butter-eater, but I suppose he really did suffer discomfort from eating “unlubricated” dry toast. The trainer was one of the old school, who believed in giving men just as little fluid as they could get along with. Butter or no butter, the crews that man trained won many races.

As to tobacco there is but one rule, and that is imperative. Stop it entirely. Neither smoke nor chew. Tobacco may be a sedative or a stimulant, according to the quantity used. It cannot be denied that it has some

action on the nervous system. The work you are doing should act as your sedative and stimulant. I think that with men of twenty who are smokers, who give up their tobacco, there is a hard struggle, and that it is accompanied at first by real discomfort. I do not believe in half ways of doing things. The instant a man makes up his mind to go into training, let him present his cigars and cigarettes to his friends. "Thou shalt not smoke, nor shalt thou chew," is written as one of the laws on the trainer's tablets.

Aside from the many advantages derivable from athletic exercise, I know of none more marked than the benefits obtained from a smokeless life. I have seen the habit of smoking permanently broken in young men who have gone into training. They never seemed to care for tobacco afterward. As for the bad effects of permitting smoking in your gymnasiums, I need not describe them. Pupils may not smoke any more than visitors.

I cannot help feeling amused when I read what was an old habit invariably carried out when a man went into training. The best thing that antiquated coach did was to look wondrous wise, and to prescribe some bitter dose or other, or a brace of pills. No matter what was the condition of the man a purge was a necessity. Some very good men of former times used to take their regulating medicine every day, and keep on at their work just the same, and rise triumphant above their double depletion. It really was as if a man were

to take every day an ounce of blood out of his circulation. This custom is of unknown antiquity. To "radically cleanse a man," as an old authority has it, was to prepare him for perfection. You could do it with tartar emetic or ipecac, and wash it down with senna tea or Glauber's salts. As often as not the trainer had some potent abomination of his own with which he literally dosed his man. Lately I read in some self-constituted authority on training, that a purge was beneficial "at the beginning." Then it went on to say: "It cannot be denied in opposition to the professors, that drugs hasten the man. It does not take so long to get him into condition." A vast amount of concentrated ignorance is displayed just here. Everybody knows, or ought to know, that there is a limit to the "hastening of the man as to condition," and that training is just one of those things where to be precipitate is to spoil a man. Nothing I could write could be better expressed than what Mr. Maclaren says: "I should advise men in training to leave all drugs alone. If unwell let them go to the doctor in whom they have faith and take what he recommends, and take nothing which he does not. There is no crudity either in bowel or brain so dangerous as this notion of amateur physicking."

Those who have read so far of the practice and theory combined relating to training, must be conscious that for the proper understanding of the subject knowledge both of a general and special character is necessary. To appreciate the reasons for the doing of the many things

which make a man perfect in his body, physiological conditions must be studied ; but a trainer who arrogates to himself the skill of the doctor or of the surgeon is a conceited idiot. Show me a trainer who gives a purge in order to prepare a man for athletic work, and I put him down as an ass, and a dangerous one at that. If I employ the most condemnatory language I can think of in regard to physicking a man, I can hardly find terms strong enough to express my horror in regard to blood-letting. I do not believe phlebotomy ever is in use to-day, and I hope it never will be.

Not so long ago Russian and Turkish baths were occasionally prescribed to reduce a man. That they are debilitating in their effects, is positive. I know of a man, the most promising of oarsmen, who had worked through one season, and overtures were made to put him in the college crew. Somehow there came a period of enforced idleness, and he waxed fat. Returning to his college and resuming his oar, he found that his corpulence did not decrease with work. Becoming impatient, and in opposition to the advice of his coxswain, who was a capital coach, the young gentleman went through a whole series of Turkish baths, and at once lost weight and was delighted. Taking to his oar again, he found a certain loss of vigor. He felt lassitude following what was really moderate exertion, and his annoyance was extreme. The sequel of this experimenting with Turkish baths ought to have been that the man lost his place in the crew. I am pleased to say he did not. He did less

work, husbanded himself, and slowly his powers were restored. He eventually found his place among the champions. This is what he told me :

“I only had eight of those Turkish baths, and they nearly used me up. I got better of them, only it took me not less than thirty days to get over their effects, and instead of being in good condition in sixty days, it was quite three months before I was all right. Now, here is something which I make no secret of : We won. Maybe I did my share in winning ; at least, I tried to ; but when we finished, I was the worst used-up man in the crew, and it took me longer than it did any of them to get all right again.”

As the late Professor Proctor explains it, Turkish baths may diminish weight, but only for a short time, and, in a day or so, bulk returns. The substances your system has lost are at once taken up again. I doubt very much whether you have removed any of your extra fat. I maintain that any artificial process which tries to bring about sudden changes is an unnatural one, and as pernicious as would be a purge. A pretty skin may be the resultant of the extraordinary methods of cleansing your system, but a pretty woman may have a pretty skin, and by no means gain strength thereby. Russian and Turkish baths, especially the latter, are admirably adapted for jockeys, but not for athletes.

If I were asked what I deemed of the greatest importance in training, after good food and good air, I should say that it was the possessing a clean skin. The plenti-

ful use of water acts in more than one way. It is not alone a tonic, but it is of vital assistance, inasmuch as it frees the body of substances not to be gotten rid of in any other way. The body, as we know, is punctured with millions of small orifices through which the perspiration passes. We perspire not only in order to cool the system, but so as to have drip from us those substances formed during exercise. Nature finds it easier to do this through our pores than in any other way.

To have the pores clogged is to put stoppers into some of these six or seven millions of the natural channels of discharge. The analysis of this perspiration shows that it is water holding in solution the chlorides, sulphates, and carbonates of sodium, and carrying with it mechanically a certain oily matter. Except in the very coldest weather, the body is always giving off moisture, and this condition is known as insensible transpiration. With a normal skin, say of ninety-eight degrees, we can see how necessary perspiration is. We are then always evaporating in order to get, not alone cooler, but to clear ourselves of the excess of salts we are making within us. In strong and violent exercise, it is probable that we give off as much as six thousand grains of perspiration in an hour. If it were continued long at this rate, we should almost desiccate ourselves, and exhaustion would be sure to follow.

In a physiological sense, the treatise has yet to be written which will show the relationship between perspiration and amount of work done. This we know,

however, that in normal temperatures, the man accustomed to work will sweat less than the soft man. If under usual circumstances a man gives off in a day and a night two pounds of perspiration, and under hard work gives off very much more, it can be seen how vital it is to have a clean skin. Nicety of person is, then, a law of nature conducive to health, and this cleanliness is only obtainable by bathing. If the salts carried from the inside to the outside of a man were not alone objectionable, in addition to these are the glandular exudations, which are positively offensive. Their adhesion to the skin is more persistent than the saline productions. We bathe, then, for that improved tone the body must receive and to get the skin in its primest condition, so that its constant and delicate work should be best performed. Some subtle theorist startled the world long ago by insisting that the civilization of a country depended on the soap it used. The question of having a clean body includes, then, the use of soap and plenty of it, not alone for mankind in general, but especially for those who are in training. As Maclaren has it, in writing about hot or cold water for bathing, if you use the latter, your cleansing abilities are lessened, though you have the tonic. If you use the cold water, you have "the brace," but no deterative effects, for no washerwoman ever did use cold suds.

When you bathe, have the water below the outside temperatures; for a hale man in good exercise the effects are capital. It is exercise in its mildest form. The

blood works all over the surface because it is mechanically compressed. Absolute shrinkage of muscles and veins takes place. Then the heart throbs a trifle more strongly, and the flow of blood surging outwardly resumes its force. This is pleasant stimulation.

There can never be fully described what a marvellous creation is the human cuticle. It is not the thermometer alone of our system, but its barometer. It tells at once the least increase or decrease of temperature or pressures. I am quite sure that it is to Maclaren that the credit is due of making the two distinctions between water to be used as a tonic and as an astringent.

When I am putting a man at his work, I incline at first to the use of the cold sponge-bath, rather than of the douche or plunge. Watching the pupil's condition, if I have commenced with water at a temperature not more than four degrees above normal outside temperatures (in summer), I rarely have used it lower than two degrees below. I know of no other rule than that a man should take a sponge bath or a cold bath every day.

I differ from some who advocate the using of the tepid bath every other day. Once a week is plenty, and then not for more than three minutes. It is on such occasions that soap is used. I see no reason why, with the hard rubbing a man gets from a daily cold bath, he should not be clean all the time. For the cold bath, there is, then, no time like that which comes early in the morning just after a man is out of bed. If after

that he has been at work and he takes a cold bath, I differ from many respected authorities in advising an interval of nearly twenty minutes. Unless my man is very much used up, I have him walk about a little before letting him take his cold bath. It is not a cooling-down process, for a cooling-down process induces a shock, and is rather dangerous. For the tepid bath just before turning in after the day's work is over, this is a good time for it. It acts as a soporific. If I find a man is just right I diminish his bathing.

In all cases, vigorous rubbing should follow the use of water. A bath attendant who knows something about massage is invaluable in a gymnasium, for how to rub a man or a horse down is an art. It is not the cuticle alone that is benefited, for the salutary effects of rubbing down are shared by the whole body. It is exercise given the man at somebody else's expense. You gain something of the vital force another man is parting with.

I never would give a tepid bath with a temperature over eighty degrees. I am not certain as to the advantage of two cold baths per diem as a constancy. In our hot American weather, I hardly see, however, how any work could be done without two baths in summer. In fall and winter I should rather incline to give the cold sponge but once a day. If my man is over thirty-five, I never permit it, winter or summer, more than once a day. This question of two cold baths per diem is one into which the personal equation enters. Strong men do better with their two cold baths than with one, and yet

when least expected, I have seen it productive of harm. A bath being in a measure a private performance, I have sometimes thought that, for want of supervision, men in training have been careless as to the temperature of their water, or have indulged in too much of its tonic. An occasional "blue look" on the part of a pupil, I never could account for in any other way than the transgression of some very common-sense rules.

It need not be insisted upon that the very worst thing that anybody can do in want of training is to bathe after a meal. Before eating is the time, or as late as possible after it. Nature behaves in the same way at all times. While engaged in doing one kind of work, she refuses to be called off suddenly to do another, and that is why we should neither eat, nor drink, nor bathe immediately after exercising.

CHAPTER XIII.

AIR—VENTILATION.

Where man differs from a machine—The want of pure air—Man when he sleeps—Recuperative action—Growth probably takes place during sleep—Automatic forces—Want of care in securing proper ventilation—The man's vitiated breath—Feeding on his own smoke—Keeping what we ought to get rid of—How to kill a man—Experiment with a dog—Action of lung, kidney, and intestines—Human miasma—The sleeping-room—Parkes' rule—Windows must be open—Have access to the outside air—Stuffy English rooms.

THERE is interdependence in the functions of the human organism. Nature has adaptiveness. She is subtle in her makeshifts. She rigs as it were jury-masts on a man and gets him somehow or other into port. It is obvious, however, that the best man is the one who has provided for him the best selected materials which withstand all storms.

I do not think the favorite and somewhat threadbare simile of the furnace and the coals, and the brass and steel mechanism holds quite good as to air. Air rather increases the combustion of my coals, if I put on a hot blast, and I may help my heat by the introduction and burning of certain gases. When a man is at work he wants one thing, pure, unadulterated and in plenty, and that is air. If air were consumed by him when he was only at work, he might select it. If a gymnasium were

crowded and the air vitiated, he could take to the open. He might then choose his kind of air. But the work of respiration goes on when he is not awake. He uses air when he sleeps. He wants it good then, quite as much as when he is at work. Vital combustion goes on then forever and ever,—never ceases until the spark of life is extinguished.

When we sleep, recuperative forces are in action, not as violent as when we are at work, but still with exceeding power. How much conversion of food into muscle takes place during sleep we do not know. It would seem natural, however, to suppose that many of the most important modifications occur during sleep, and this has been gravely advanced, that growth of the body in length and bulk, is more likely to occur during the sleep of the individual than when he is awake. Anthropometry, or the science of accurate human measurements, may present some day this fact more clearly. Sleep then is apparently rest to us, but absolutely as far as our bodies are concerned, this is not the case. The food taken digests in sleep more slowly but more surely. Automatic forces, none the less potent because unappreciated, are at work. Here then is the body of the man who sleeps. He has exercised freely. His food and drink have been properly selected and in sufficient quantity. So far we have done all we can for him, and we leave him. Ought we to trust to luck for that other most vital element, the quality of the air he is to breathe for the next seven or eight hours?

If we are careless about that, we are as it were filling him with vital force through two-thirds of his day, and taking it away from him in the last third of his twenty-four hours, and just when he could least afford to lose it. He may be doing the worst thing at the most inopportune time.

Do we not know that the man as he sleeps, is giving off in his breath the internal combustion of himself? We are as it were accumulating poison, and for lack of thought as to ventilation, making this unfortunate creature breathe over and over the exhalations of his own body. We feed him with his own smoke. Here is your horrible mixture of carbonic gas, of sulphureted hydrogen, some of the decompositions of water in the air of the room. It is the waste products we are trying to treasure up. Nature has been doing her best to get rid of them, and we are bent on keeping them.

I can kill a man by means of introducing carbonic acid into his room while he sleeps. Men who work at the bottom of wells, perish that way. The breath with its watery vapor carries this gas out of the man, but in addition to this, there is a special nitrogenous substance known as sudoric acid, which is found in perspiration. The constant evaporation known as "insensible transpiration" is taking place. As to the many products of cutaneous excretion the greatest authority of to-day says, their poisonous power is well established. "We have no names for them, but we know they are deadly because they kill when not eliminated."

Whether the story of the poor child, who, coated with gold-leaf, died because his skin could no longer give off its secretions, be true or not I do not know, but this experiment was made by a physiologist on a dog. The animal was closely shaved, then varnished with collodion. Within the creature, all the secretions, aqueous or vaporous, were sealed up. In eight hours the dog died.

We have the intestines, the kidneys, the lungs, and the skin all functioning. We cannot overlook one of them. The worst accidents arise by the repressing of any one of these functions. Take the two functions of the lungs and the skin. By exercise we have brought these in the man under training to the highest degree of efficiency. As he sleeps he is working at his best with lungs and skin, and we are poisoning him by the preservation of his own exhalations. Brown-Séquard shows that the human breath "contained a most active poison, an alkaloid capable of killing in two hours an animal into which it was injected." Human miasma is something then to be dreaded.

The sleeping-room of the man who is in training must have free access to the open air. I do not care to give too much space to the exact quantity of free air necessary for a room. Parkes, who is the soundest of authorities, makes this general statement, that natural ventilation would be such possibilities of air in a room for one person, as would allow all the air to be renewed in it four times during the hour. This change of air would depend, however, on many accidental causes.

Men who are at work should sleep with windows open. In our summer climate, to sleep with closed windows is impossible. But do not close the window in winter. In our badly constructed houses, where the waste products coming from defective drainage permeate them, an open bed-room door does little good. It may dilute the poison and nothing more. The man in training must learn to sleep in winter with an open window. I do not mean a foot of open window, but certainly a half inch. A healthy man well covered does not feel cold when he sleeps. This question of ventilation has a local treatment in the United States. On the Continent, especially in the cities, death is supposed to follow a sleeper who has a window open. The wretched sewerage of the past was possibly dangerous in its effects on sleepers.

In England, an American going among boating men attached to the universities, told me of his amazement at "the stuffiness" of the chambers in which men under training slept. Expostulating with these young gentlemen as to the miasmatic atmosphere, the reply was: "Oh see here now, open windows would not do here at all. We would get awful colds and a generally nasty feeling. Ours is a damper climate than yours, and what would not hurt a Yankee would kill a Britisher."

CHAPTER XIV.

SLEEP.

Advantages of regular hours—Time of going to bed and getting up—The hours a man may sleep—Eight hours none too many—The dangers of insomnia—Precautions to be taken—Early rising—Sleep during the day—Drowsiness—Shocking a pupil—Over-mental stimulation—Necessity of watchfulness on the part of trainers—Dawdling in sleeping-rooms—The tonic of waking.

LITTLE need be said in regard to the advantage of sleep for the man under training. There are only two points of advice to be given. One is, that there must be regularity in the hours of going to bed and of getting up. Active training being generally carried on during the more pleasant season of the year, turning out early in the morning brings no physical discomfort. The man at work ought to be in bed at half-past nine and sound asleep in the next five minutes. He should be up and awake at half-past five o'clock. He would then have had about eight hours sleep.

I have never yet seen any sensible book which insisted on the serious curtailment of eight hours of sleep. Sometimes a sleep of seven hours has been recommended as bringing about a better condition. I doubt very much if any good reasons could be given for exactly seven hours, and representing them as the limit of a

natural rest. I should not be uneasy if a man in training continued over nine hours. If at the very beginning of work, a man under my charge wanted to sleep his nine hours, I have not awakened him for the week or so, but after that I have thought it wiser to bring him down to a sleep not exceeding eight hours. I have supposed, and I believe correctly, that in this case Nature was only asserting her claims on growing men, for men who grow want their full eight hours.

Giving to physical expenditure its fullest value, I am somewhat of the opinion that for the depletion of the system it is not any more severe than mental work. Men who labor hard with their brains ought never to take less than seven or eight hours of sleep. The surest sign of a mental break-up is when insomnia comes. The duration of sleep alters with the age of the individual, with his idiosyncrasies, and even with his surroundings. A man sleeps badly because he may be too warm or too cold, or his digestion is imperfect, or he has been mentally disturbed. Precautions should then be taken, that, as far as bed-clothes are concerned, these coverings are increased or lessened according to temperatures.

Generally a man, who is rising in the scale of physical conditions, "sleeps like a top," indifferent to his surroundings. A well-tired soldier snores on, and a cannon-shot does not awaken him. Differing in toto then from some excellent authorities, I do not think six hours enough, and I have encouraged a full eight hours' sleep. I have always laid great stress on the time of going to

bed, and think that when a man is up beyond 10 P.M., every minute after that is the worse for him.

I want him to be up and out when the air is freshest and purest. We have given up the ozone fads, but there is no question that the early morning air is full of vital force. Between 6 and 7 A.M., that one hour helps the man more than any other sixty minutes in the whole day. The human coil which has been spent the day before, has now recovered its temper. It is, as it were, imbued with subtle power, and more than at any other time it is ready to take its spring.

Sleeping during the day, the siesta, I have never favored. When I have seen an athletic pupil heavy and drowsy during the hours when the sun shines, I have considered this as indicative not of some physical defect, but that the work has been for a moment beyond his powers. In such cases I have diminished the tasks. I have found it of advantage to lengthen out the night's rest by as much as an hour. I have had men under training who began with the occasional drowsiness, but who got gradually over it under judicious management, and ended by becoming thoroughly proficient. When a man is in his highest physical condition, he never is sleepy save at regular hours. Above all, it is exactness as to time of doing everything—eating, working, bathing, sleeping—that makes the man.

I should impress this point on men who do the training, and it is, never to shock a pupil. Say a man is dull. To shake him up roughly is a mistake. As

well send an electric discharge through him. You do him more harm than good. The worst conception of your business is to expect of Nature more than it can perform.

Sleeplessness may occur during the middle of training. I look at this as the graver of the two conditions. Studying it carefully, this phase is evidently due to over-mental excitability. The brain stimulation has been carried on to excess. The head has worked more than it should, and refuses to diminish its activity. When this happens there must be instantaneous stoppage from work; I do not mean diminishing, but arresting exercise. The man must do nothing for twenty-four hours at least. If work is resumed, it must then be gradual.

There is no use in trying to do anything with a man who does not sleep his full time. It is even dangerous. The cure may come by dint of time and patience; but as far as concerns such a man taking a leading place in athletic performances, it is impossible. He might as well not eat. The breakdown is certain. If after a warning of this kind an accident happens, it is not the fault of the man at his work, but his trainer.

No major or minor incident should escape the trainer's notice. He is bound to ask his pupil many questions, and on his part the pupil should be as open, frank, and responsive as possible. Little things, which the man in training would not think of any importance, may become serious impediments, and prevent him from

occupying the place he might occupy. It is a trainer's business to acquaint himself with all these details. If he understands his business he may arrest the progress of physical faults, and more than that, cure them.

I despise dawdling in a sleeping-room. When a man after a sound sleep opens his eyes, he should try to get himself at once awake.

I think the highest proof of a sound mental condition is when a man rises, and in the next five minutes remembers all that he has done the day before, all that he intends to do during the coming hours. I cannot describe the superb feeling of a man who, with his fine muscular development, awakens like a young giant refreshed from his slumbers. It is the acme of physical enjoyment. Life and strength stimulate every muscle. It is the rapid transition from sleeping to waking, which is the best of tonics. The man has forgotten all about the toil of yesterday, and only thinks of the accomplishment of his labors for to-day.

CHAPTER XV.

CLOTHING.

Bed coverings—Dress—Flimsy theories—Clothes never made an athlete—Use of white—The shirt—The drawers—The proper fit—The cut—Worsted hose and socks—Shoes—When races are to be run with bare feet—Indian races—Soles of shoes—Leather or rubber?—Oil or vaseline for shoes—Overcoats and wraps—In the dressing-room—Belts and buckles.

IF the furnishing of beds is to be included under the head of clothing, no over-quantity of bed clothing is to be recommended. Any Spartan rules in regard to this would be silly. The active season in this country for athletics being spring and summer, a man may do just as he pleases as to bed coverings, suiting his own inclinations.

As to dress, there is little to be said about it. There have been theories of astounding flimsiness built up in regard to a man's getting strong by only wearing woolen garments. It would be just as reasonable to say: "He became an athlete because he sported a certain kind of jumper." Any material that will absorb perspiration rapidly, and can be easily washed and will not shrink, does well enough, providing the stuff does not chafe. I have no fancy for materials which are colored. White is the best. It does not absorb nor retain the heat. If it gets dirty sooner than colored material, then

it necessitates cleansing more frequently, which purification helps the man who wears the garment. The shirt I like best is sleeveless. Tight-fitting things are good for circuses, and nothing else. Collar-bands should be loose, if collar-bands are used at all; but a bare neck, with no impediments for the throat-muscles, is the best. I like a fairly loose, baggy cotton shirt, not made of closely-knit fabric. I want ventilation, and plenty of it, while I am at work. Drawers or trousers should have broad bands that hold to the form, rather because their surface covers the waist, and by contact prevents their slipping. I think drawers for sprinters should extend somewhat below the knee. If there happens to be a slip and fall, there is less loss of cuticle. For hurdlers I believe in long drawers, because they leave the knee free, and keep out splinters which may be taken from the wooden bars.

I am a strong advocate for worsted hose and socks. I think they induce sound feet, and prevent abrasions and bruises; but I am of the opinion that the best time is made on the cinder track by those who wear no socks at all. The foot must become indurated. A shoe is bad enough as an impediment, and perhaps some day or other the barefooted ones will knock off a second in sprinting. I know that human hands never could play a violin or piano with gloves on as well as without them. This barefoot idea is not original to me. It has been mooted before. I have seen Indians race, and though their moccasins were thin enough, they generally threw

them away before running. I have noticed, however, that the tracks they ran over were fairly smooth ones. I cannot state that there had been a Shoshone track-layer and supervisor, but it looked as if some prior care had been given to the grounds.

It might take a very long time for a man to indurate his feet for this kind of work, but I am led to believe that if he did succeed in doing that he would gain something. Those flexor muscles of the toes, and that grand muscle that covers the sole of the foot, might do better work unhampered. I need not expatiate further on this subject, because we run shod, as do our horses.

I am conservative enough to like a thin-soled leather shoe better than a rubber-soled one. I am told that rubber soles prevent slipping. My reply is, that a man who knows how to run ought not to slip. A man who is perspiring freely, the sweat pouring down his legs, is sometimes hampered by actually running in the water his rubber shoes hold. I want a man who is a runner to have never less than three pairs of shoes, all precisely alike, and of the same weight. While at work, use two pairs pretty regularly, changing these two pairs daily; the third pair put on only semi-occasionally. When this last pair are perfectly conformed to the foot—broken-in—they are to be put aside. Have this reserve pair of shoes given, soles and uppers, a good rubbing with vaseline, which as a preservative of leather, during short intervals, I think better than grease. The soles of this pair of shoes held in reserve must not be worn in any

one place more than another, but ought to be perfectly flat. If spiked, the prods must be well looked to. For rapid work, as in sprinting, all precautions should be taken as to rig. For other work this extreme care is hardly so important. I have a great distaste for all kinds of jaunty apparel and fancy costumes. The man at work looks best who has on the plainest and simplest of get-ups.

If in the open air, a fairly warm garment, an old fall overcoat—something loose to throw over yourself—is a necessity. You ought to be, in a measure, indurated to changes of temperature, but after having become red-hot through heavy work, when you come to a standstill, your task having been accomplished, the wind may have veered from south to north and the temperatures lowered. As there are chances of catching cold, or your stiffening through sudden or long-continued exposures, an additional wrap is a necessity.

I may add, when your work is over never dawdle. Move around briskly. You will recover yourself eventually better that way than by coming to a dead halt. Make haste to the dressing-room. Do not sit down there. To cool down properly, if you are warm, is to take time in the cooling down. If you take your bath and sponging off, do not forget the clothes you were working in. Give them the chance of becoming refreshed too by airing, and better than that, washing. A man at work, to be comfortable, should have not less than three complete sets of clothes. You will feel bet-

ter from the change, and the chances of having a clean skin are improved.

The less I say about a belt the better. They are fashionable and of all colors. Intended to keep up the drawers, if broad and very supple, holding up the nether garment by breadth of surface, they may do no harm, if they do no good. A buckle no one should ever stomach even for little spurty work, where no great exertions are required. In lawn-tennis belts and buckles are nice, but for serious labor where the least impediment galls, chafes, and checks muscular work and impairs circulation, the true athlete despises them.

I have known men of late (in the fashion) who work and do good work, too, with broad scarfs around their loins. These sashes, made of silk, the wearers have thought helped them. I believe them to be useless. The set of a man's hips, if he is well-built, should, with properly cut clothes, keep his trousers or drawers on him without any of these fanciful adjuncts. Head coverings are superfluities when exercising, at least when the sun is not shining.

CHAPTER XVI.

WORK.

No royal road to perfection in athletics—"Samsons in five minutes"—Running in a groove—Disadvantages of any system—Apparatus—The true athlete not subject to either machinist or carpenter—What apparatus has done for us—The sulky and the bicycle—The home gymnasium—Dumb-bells and clubs—Foreign systems—The paver's rammer—Milo—Machines which measure strength—General exercise—The grading of exercise—The three distinctions—Quantity of work—Difficult exercises—The trapeze and the Germans—Gentle, moderate, violent exercises—The gymnasium the place to create and store strength—Parallel bar—The oarsman—Proctor—Where an oarsman is at fault—The runner—How can a man acquire speed—The jumper—Improvement of a single muscle impossible—Tendency to work too much in one direction—Discrimination—The stout and the thin lad—"The go-as-you-please" class in a gymnasium comes to nothing—Production of better types through exercise—Measurements taken in military gymnasiums—Women who exercise—Dr. Sargent—Gradual introduction of pupils to their work—The medicine-bag—Exercises of grip—Springboards—Where the Germans surpass us.

I NOW approach what is the pith and marrow of the whole subject of physical exercise. As it may be seen, to get into the finest condition and to keep to that condition, there are many considerations as vital as are the exercises of the gymnasium or the track. Hours might be spent in the gymnasium by an under-fed man or a

sleepless one, and instead of getting strength, he would but weaken himself. All such helps as nature or art can give being thrown into the balance, the normal man who exercises must rise in the scale of bodily vigor.

At the very beginning I want to say, that like in anything else, there can be no royal road to perfection in athletic performance. You can get strong in a much less time than you can get learned, but time is a necessity for both conditions. No man ever mastered a science by reading a single book, nor can a man be an athlete who works only on the parallel bars.

I lose patience over such publications, which, though not exactly, entitled "How to Rival Samson in Five Minutes," induce readers to believe, that by following out one single system, the best results can be arrived at in the briefest periods. Some of these works run in a single groove, and vaunt their one method as capable of accomplishing everything. Such books may do no harm,—all they bring about is disappointment.

One peculiarity of a "system" is to expatiate over certain apparatus, as if the improvement of physical conditions was a subject entirely under the control of the carpenter and the machinist. No one questions the fact that improved apparatus is of great importance. If in partaking of food we consume but a single aliment, the palate tires; so in exercising, one apparatus induces weariness. If there are better performers to-day with the more rapid maturing of the man, it is not to be questioned that this arises in no small measure from improved apparatus.

I am somewhat of the opinion that where speed is the object, better time has been obtained from excellence of track. The apparatus for work has made toil easier, and when the supreme effort comes, it is accomplished under the most favorable circumstances. The trotting horse cuts down his record by a second less, not entirely from increase of speed, but because the builder of the sulky knows how to distribute the weight of the driver more evenly, and the axles on which the wheels run have more perfect bearings. Comparing the performances of the bicycle to-day with those of five years ago, the greater speed is due less to the men, and more to the machines and the tracks. It would be a bold man who would prophesy that the limit of excellence has been reached, in any of these performances, where there is a mechanical adjunct. A man's legs do not move as fast as his brain.

Variety of apparatus is, then, one of the great advances made in gymnastics. The point made here is that they are adapted to varying capacities ; some are for the untrained who begin, others for the trained who wish to perfect themselves. Their variety has, too, this advantage, that they call into play all the muscles of the man who exercises. If that important factor, the brain, which furnishes the stimulant, is not wearied, it has then better opportunities when there are calls of different kinds made upon it. I defy a man working with a single apparatus to be a good all-around man. The impossibility of such a thing is manifest. It is true that an

arrangement which costs altogether \$1.50 to be rigged up between the jambs of a door, will benefit the general health of those who use it. You may, too, if you please, discard all apparatus and move your arms, your legs in certain directions without any clubs, wands, or dumbbells, and gain vigor. Sometimes this sole idea, however, is pushed to a ridiculous length, and an elaborate argument has been presented to show how, by only expanding and contracting the chest in a prescribed way, and putting under control the muscles of the abdomen, the result will be in time the creation of a pocket Hercules. Occasionally such stuff is carried to absurd lengths. There are "foreign systems," which lay down gravely the advantages of scratching your left ear with your right hand, and the right ear with your left, and the benefits are heralded of crooking your first and second finger when your legs are in a peculiar position.

You can no more educate yourself with a single book, than you can become athletic with but one or two, or even half a dozen movements. The trouble about the man who works but few tools is that his body assimilates itself in time to the tools. Suppose, for exercise, I were to advise a man to take a course of "paving" and give him a paver's rammer. That is a fairly trying kind of work. Say I begin by giving him a rammer weighing but a few pounds and then gradually increase its weight. In time my man might improve, but he would become a lumbering creature with abnormal muscles developed in his back, and with round shoulders. Milo is said to

have carried a calf on his back until it grew to be a four-year-old heifer. But that Greek could never have walked with head erect.

In going into a gymnasium the greater variety of apparatus to be found there, the better will be the effects of such apparatus on the man who works with them.

Machines for measuring the increase of the actual force of those who exercise, so that improvements can be strictly determined, are necessities. More than that, they are incentives to work. Anybody can say, "You look stronger," but here is a machine which is alone unbiased. It has no purposes to serve—does not flatter. It tells the actual truth with its levers and ratchets of steel. Certain mechanical appliances I may be partial to, and I cite some of them later on as being advantageous for special work. I am, however, treating of general exercise, and I repeat, that I have in view the production of the good all-around man, because from that material the specialist is made. Do what you may, there will always be some one who has in himself certain inclinations for particular kinds of work, which must exert their sway.

Lagrange makes the proper distinctions when he presents the three classifications of gentle, moderate, and violent exercises. You may begin with the first, reach the second without knowing it, and then arrive at the third stage, and may pass through in all three of these conditions and be barely able from your own conscious-

ness to discriminate between them. Difficulties are not to be confounded with absolute fatigue.

Certain simple movements may be made difficult because of their accomplishment with a different class of muscles. The heavy man mounts the steps leading to a room without much trouble. If he were to go up the rungs of a ladder to accomplish the same thing, he would tire himself. He is doing with his arms the work of his legs. Here is the point to be brought out, that "quantity of work" does not comprehend difficulty of work. There are many things done in a gymnasium which are rather the result of skill alone than due to strength.

Referring to "the system," the trapeze brings out conspicuously what is referred to when a single apparatus is vaunted, as the only one which should serve the purpose of the gymnast. The trapeze is the constant exercise of the Germans. It is good in its way when used in conjunction with other apparatus. To acquire proficiency on the trapeze is to bring into play the utmost nicety of muscular work—in fact, all its elegancies. It needs more science than strength. How to overcome difficulties is a part of the general study of gymnastics, but not its exact end. A man may acquire all the details of execution and not be strong. I may be a graceful dancer and by no means strong. It is general strength we should seek in a gymnasium.

What are we to do so as to determine what is mild, or moderate, or violent exercise? When treating of the

respiratory organs the effect of quick or long-continued work on the lungs was cited. We ought to have a ready measure to sum up at once our capabilities. With Lagrange, then, I would say, that when a man of average strength feels neither fatigue nor breathlessness, the exercise may be called gentle. When the exercise has caused local fatigue without inducing breathlessness, it will be "moderate." It should be called "violent" when it is accompanied and followed by breathlessness.

When the question of sheer strength is to be sought for, it is in the gymnasium where it can be best developed. Such displays of strength call not a single set of muscles, but for the whole of them. To accomplish an exhibition of strength, an effort is necessary, and in this effort every part and portion of the man is at work. It may sometimes, however, be so exerted as to be barely perceptible to the looker-on, visible rather when the effort is over, for then the breathless period follows. It should be remembered, that any display of strength never can be long sustained. The disturbances following it are not, however, as lasting as those where there is real nervous disturbance, such as is brought about by running. The gymnasium, then, is the place for the creation and storage of strength, not local but general.

Health is acquired by a gradual physical education. Human drill takes place there, not special but general. The parallel bars may impart their help to the arms and shoulders of the man who is to be the stroke-oar in the boat race to come, but the bars will not give him that

power alone. The arm is one thing, the attachments another. There is the shoulder, the upper, the fore-arm, the wrist, the hand, each of which want their thorough education. As Mr. Proctor says, "rowing alone is an insufficient exercise for the arms," and so the bars alone are an insufficient exercise, if rowing be the objective point. A better arm is acquired by a steady six weeks' work with the clubs alone than a whole season's rowing will give. That this is palpable, even the most enthusiastic of rowing men admit. Rowing tends to the development of the back, loins, and the legs, but the biceps of the arm increases in no proportion to the heavy work done. From particular anthropometric measures, I question if the man of short stature who rows has the muscles on the top of the shoulder or the deltoids improved in the least.

Let us take the man who wants to run. Any school-boy if asked, "What makes good running?" would answer, "Why, legs." Though the work on the legs is apparently more constant than the arms, it is but rarely that legs are well developed. They may be shapely from inheritance, but they are not often "good working legs." There is this about legs. Being more in use than arms they are readier when provided with selected work to improve than are the arms. Nothing comes up more quickly from stiffness to suppleness than the knee-joint. The leg includes the upper thigh, the knee, the leg from the knee to the toes, but more than these are wanted for speed.

To speed a man, a very thorough gymnastic exercise is necessary. The gymnasium is the preparatory school. I know of nothing which requires a more thorough development of the abdominal muscles, with those of the waist, than running. It is the combination of all things from spring-boards to clubs which brings about that proper condition. You never will do jumping unless you are prime from the waist upward. You may not have the great muscles of the hammer thrower, but you have fined them down until they will give you all their spring when you take the upward propulsion.

In the jump, the crural or leg-muscles play their part, and are necessarily the more important, but "that cautious crawl" the champion tells about, means that when he straightens up every muscle of the back the whole spinal system throws in its power to help the spring. The thews, the muscles of the arms, help the lift. The jumper jumps all over. The earth is the fulcrum. The movement propagated at the point of contact with the toes, fires the whole train of muscles, and as a champion informs you, this general excellence has come from gymnastic work. It was general at first. It had to be. Afterward came local education. This treatise has been but half understood if the main fact has not been seized before this, that it is only the man generally good all around who can become the pre-eminent performer in a single direction. To repeat this, it is to be trusted, will make its impress all the stronger on the reader's mind.

I have studied such works for information as have presented the idea, how one kind of machine does improve a certain muscle. They read something like medical advertisements. "The diseases being named A, B, and C, these want for their cure the swallowing of the bottles marked X, Y, Z." There might have been some reason in these assorted prescriptions. I am sorry to say I never quite understood them. The muscles themselves were all properly designated. There might have been some ambiguity as to their exact position, which differed as to the position the man took. They might have been not so much out of the way, only I refuse, as ought any sensible man, to put entire credence in instructions I could not understand.

There is a tendency in the gymnasium for certain pupils to keep too long at one special kind of exercise. It is not to be supposed that this kind of preference arises because some one kind of exercise is easier than another. On the contrary, I have noticed pupils who have seemingly at the outset set their minds on trying to do what was not only a fairly difficult exercise, but one of the violent order. Such work being unfitted for their abilities, I have checked them. I have not found fault with their ambition, rather praised it, but told them that the accomplishment of the task was in their future. All parallel bars, or all trapeze, or all ladder, or all rings, or too much spring-board or horse vaulting, or jumping, or too much of anything by a pupil is to be decried. A man who is in charge of a gymnasium ought to have the

watchfulness of a schoolmaster, but at the same time he must use discrimination, particularly with younger pupils. Discrimination comes in right here. A short, chunky build of a boy may never do much on the spring-board, so you might think. He is ambitious and wants to feel the pleasure of launching himself in the air. It is possible that as he grows, he will vary not so much from his younger form. But I am not to be too certain about that. Let him jump and vault. You are helping him on the side in which he is naturally deficient. Stop him when he does too much of it. Incline him, however, to the greater suppling of himself. If his happiness is in the spring-board business, let him do his proportion of work with it. The tall, weedy boy may turn out to be the runner and sprinter of the future. What I want is to give him just that particular natural development the chunky lad has in excess. They may take to the same spring-board as ducks to water. They improve in that direction at once. They alter from their hips downward, but remain fixed in their upper measurements. I require those lads then to do less of jumping and vaulting, which are the easier things, and to work on parallel bars, and with all such apparatus which will develop them from the waist up. The natural bent of the chunky lad when he becomes the well-trained adolescent, may be to become a walker or a weight thrower, or one of the crew of a boat. There are many other things he might do and do well. The slimmer lad will make the jumper, hurdler, sprinter, but his success

in the future will be due—not to his having done this or that particular thing in the gymnasium, but to the fact that he has been under the eye of an intelligent master, who has made him do all things.

The “go-as-you-please” or “do-as-you-please” class of a gymnasium, will rarely bring forth any single man of merit, and the general average of physical excellence will be low. If I were asked how long systematic studies should be carried out, I should say with a class for quite eighteen months. In European military schools, where discipline is necessary, the regulation method never ceases.

To teach systematically is not to be monotonous. I can vary the order of exercise. I can gain my object in more than one way. I have by systematic exercise a better opportunity of judging of the idiosyncrasies or physical peculiarities of my lads.

In presenting the two types of the short and squat lad, and the thin and spare one, and trying to get them into good shape, I should be rightly held to task if I held to the assertion that the chunky lad never would make a sprinter, or the slim one never become a performer of heavy work. I have seen, as have all trainers or teachers of physical exercise, many strange changes brought about by work in the gymnasium. Careful exercise has, however, never failed in bringing forth fine results. The lad of heavy physique has been proportionately lightened, and the lighter man has been proportionately made heavier.

The plastic character of the body has sometimes struck me as marvellous. The one thing proven is that, by good training, a higher type is always produced. Work has not stunted growth or checked it. It has given it a new start. If it were only a physical bettering that had come about, that would be something, but physical and mental improvements were distinctly appreciable.

What the gymnasium, with outside work, has done for the man is better presented by foreign than by home statistics. Careful studies having been made, it looks as if military training, other than the mere manual of arms, has very much improved physical conditions abroad. Maclaren has presented some interesting statistics of the measurements and weights of a detachment of non-commissioned officers sent to him to be qualified as military gymnastic instructors. Being a picked class of men, they show the best examples of a very thorough system.

The men were all soldiers, from 19 to 28 years; in height from 5 feet 5 inches to 5 feet 11½ inches, and in weight from 128 pounds to 174 pounds, so that extreme types were represented. These men worked for eight months and were systematically trained. It was found that they had gained on an average of ten pounds, with 2⅞ inches in girth of chest, ¾ of an inch in the size of the fore-arm, 1¼ of the upper arm, while there was in every case an increase of height.

A man of 28 had grown from 5 feet ¾ inches to 5 feet 8¼ inches. A man of 24 from 5 feet 8¾ inches to 5 feet

9½ inches. Expansions of the chest were wonderful. In one case, with a man of 24, the chest had grown from 35 to a diameter of 40 inches. This increase in general muscular growth was not visible alone, but became rather amusing, because very soon the men could not get into their clothes. Military discipline had to be relaxed for a while, and so non-commissioned officers had to do duty in shirt-sleeves until the regimental tailor could make the necessary enlargements of their uniforms.

What I want to show is not so much the increase of arms and legs, or chests, but actual growth due to gymnastic exercises. It is not the lads who grow naturally with years, but the men, those of twenty-five, who can take on parts of inches.

We all are hopeful that the time may come when that dread arbiter, the sword, may be forever sheathed. Nevertheless, if physical conditions are to be looked at, then a healthy man is a happier one, with better capacities for toil. Sound limbs give a sound brain. Military training then, such as it is to be found in Germany, does bring about great benefits to the Teutonic race.

Taking not alone men with such advantages as physical training gives them, women must derive benefit from the same sources. English anthropometrists are coming to the conclusion that their own women are increasing in height, and rather in the well-to-do classes than in the lower ranks. If there is any argument that can be advanced explanatory of this physical augmen-

tation, it can only be due to this, that English women have taken more and more to indoor and outdoor exercise. Dr. Sargent's table of the average development of two hundred young men at Bowdoin College, brought about by simple apparatus,—as dumb-bells, Indian-clubs, and pulley-weights,—shows how little complicated mechanisms have to do with physical increase.

I have often tried to formulate what should be the precise routine of work to be undertaken in a gymnasium. I confess my inability to do so. With a pupil before me, though I may be able to appreciate his requirements, the task is not so easy. It has been somewhat my habit to make the tyro begin with light clubs, rather to induce suppleness at first than strength. Lifting of weights, pulley movements have been the last things for him to do. You never read in a book on physical exercise anything about ruptures, and these brought about by want of care on the part of exactly that person who should exercise the greatest care. I know all about the spring, the elasticity of youth, and how it is made to bend and never to break, and that there is "a kind of Providence for children and drunkards"; but I have known, not children, but lads of fifteen or eighteen, badly hurt by attacking too suddenly work not apparently beyond their powers, but which by some unknown cause brought about lesion.

It is the gradual introduction of the pupil to his work in the gymnasium which I would advise. By being cautious you gain your end sooner. Of all modern

things in the gymnasium, I like the "medicine-bag" the best. Nothing improves the man more than this—that is, after he has done some work. I have sometimes thought that if I ever did prescribe a simple exercise, it would be the medicine-bag. It takes room to work this properly, and two men can get more good out of a medicine-bag than one. It is a ball covered with leather, about twice the size of a Rugby foot-ball, made of hair and twine, and not too tightly stuffed. It should never weigh more than twelve pounds. I think it as good an all-around aid as I can find. The suspended ball, hung about on a line with an extended arm, is also excellent. If hung in a corner, so that it may rebound and be stopped, or driven off, as it flies toward the gymnast, or leaves him, this affords fine exercise. If it weigh eighteen pounds, that is quite heavy enough. When over twenty pounds, to strike it and work at it rapidly becomes violent exercise. I advise beginners to be cautious, however. This suspended ball or bag, excepting that it does not strike back, represents very closely the efforts made by the pugilist, and is on that account very much in favor by the professional boxer. Parallel bars are made not alone horizontal and perpendicular, but on a slant from the floor. Perhaps some of these are over-refinements. Still if some few of the fourteen varieties I know of are really superfluous in a physical sense, at least they are mental helps, for novelty stimulates. I am very much in favor of the nautical wheel, having noted its good effects. It works the biceps in

a new direction, and is good for the antagonistic muscles. It is not because it has a nautical look that it seems good. It has intrinsic merits. I never have, however, seen much in the various inclined planes for leg developments. Special work for legs I believe in, but benefits are to be had by simpler methods. Somehow, though I have never slighted legs, as I have before stated, legs in a normal man seem to better themselves sooner than any other portion of the human structure. The reason is, that unless we are asleep or seated, our legs are always doing their work. If they were not automatically in business all the time, we would crumble like a ruin, our props giving way.

Machines for improving the grip include the bettering of the wrist, and consequently the whole arm. Grip comes readily. There is hardly an exercise, the hands being called into play, where the tendons in the fingers have not to do their part. Sometimes I have thought that the wrist exercise called on too much local energy. I mean to say, I have known of pupils with wrist troubles from the use of this machine. The effects were transient, but there was no reason why they should have existed at all. The other form of machines, called "fore-arm developers," where a small handle is turned, hampered by a mechanical device, I have found brought about better results.

There is a tendency of late to put the spring-board as among the lumber of the past, and I think not wisely. For general leg-work—improving the knee and ankle,

teaching the toes their proper individual movement, and reaching higher up than the thighs to the abdominal muscles, with those of the waist—I know of nothing better for beginners than the old-fashioned spring-board. I do not like the coiled wire-spring with which modern spring-boards are provided. Such metallic springs do not work evenly. I favor the old-fashioned ash-built spring-board that would send the lad flying into space with but slight effort. As an exercise it certainly brought out confidence and grace. A gymnasium without a horse to vault over is no gymnasium. It is “Hamlet” with the Dane left out. The horse is certainly the oldest of all gymnastic paraphernalia, for the advantages of it were at once manifest. It leads directly to the more precise jump over the bars. The Germans beat us all to pieces with their work on the horse. That special exercise they have made perfect, and can show us many feats of skill with the horse we never dreamed of. The horse, and how to vault, might be almost called a “Turn-Verein” specialty.

CHAPTER XVII.

TRAINING WITH REFERENCE TO SPEED.

Sprinting—Running—Hurdling—Walking.

SO far we have been directing our attention to all-around work, such as has its formation in the gymnasium, and is practiced there without specializing any particular kind of work. Strictly adhering to the idea of preparation as only obtainable in the gymnasium, we now come to one of the most important specialties of training, and that is the attaining of speed by the man. If we consider it scientifically, speed is an exercise that requires the repetition of certain precise muscular movements. It is a type of violent muscular exercise. Run hard and long, do over and over the same things with a precise action, and there comes quickly enough the indication that it is a violent exercise, for you suffer from want of breath. The greatest amount of work is to be done in the briefest time. You contract and expand, and contract and expand one set of muscles. I do not think a sprinter ever suffers much from any of those physical aches which gymnastic exercises sometimes produce. It is breathlessness that really stops him or slows him. In no exercise a man takes is there such a demand made on him for vital energy as in running,

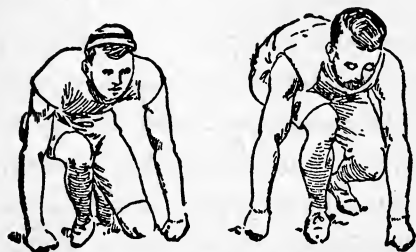
and for that expenditure of energy the repairing process is longer.

No work then tells so rapidly on the man as does running at high speed. If the man keeps his weight when in training he is doing well. He is giving more away in the ten seconds, or the ten minutes, or the hour, than he can get back in ten times that period of rest.

The preparation for the man who is to run must be thorough, and yet over-preparation hurts a man. Just the time when a man may be in his prime, may not be his race day. The art of the trainer is not so much to keep his man back, as having in mind when is the exact day of the race, to have his pupil ready for it. An ex-champion said to me, "The 100-yard dash needs the nicest training of all the runs." I question whether there is really more nicety required just then than for the longer dashes. Perhaps more skill and practice for this special work is requisite. But there is no question that to get in ahead does require great perfection of training.

If sprinting is considered as a fine art, it wants the man to carry himself at the top of his speed from the time the pistol is fired to the last inch of the track. He may or may not quicken his time, for a 100-yard dash does not permit of any nice calculations. As has been previously stated, almost any fair-limbed boy can run a good gait for 50 yards, but the ordinary young man who had not been trained cannot cover the 100 yards, say in 20 seconds. Now this distance has been run over in

9⁴ seconds; 125 yards in 12²/₅ seconds; 150 yards in 14³/₅ seconds; 220 yards in 21²/₅ seconds; the quarter mile in 47³/₄ seconds; and 600 yards in 71²/₅ seconds.



THE SET—POSITION FOR STARTING.

To train for speed, a man must bear in mind that it is gradual work that helps him most. Let distances to be covered be at first short. Never try to be lightning. Keep

that commodity, if you have any of it, until the time has come to use it, which will be later on.

If you are on the rise of your life and improving, you can bear then that great exhaustion of trying to do your very best once before the time the race takes place, but I should be fearful of repeating it too soon before the actual contest. Occasionally do your best and spurt, but not for too long. When you



RACING.

slow down, try and consider exactly what is your condition. If you feel no worse for the extra exertion as you finish the run, put in the speed again. Long, speedy walks, at not too fast a gait, taken every day, are necessities. If weather does not allow of it, find some covered

space to walk in. All the time watch out, so as not to over-train. It is so easy to jam your muscles, so as to produce friction. Suddenly you become stale, and then your chances diminish.

As to diet, it should be the same as for any other kind of training. There is no special food for champions. Sleep the full eight hours, and be careful as to the ventilation of your room. Sprinting, I think, is unfitted for lads. I never want to see a lad of less than sixteen years old on the track. I know there have been some marvels who were less than sixteen. I am afraid, and have to be afraid of such lads, from a careful consideration of the subject. I am always in dread of organic troubles. When we kill a boy or so, because his heart literally breaks, then the folly of this business will be seen. A two-year-old is more mature as an animal than a boy of sixteen, and a boy is more valuable than the best horse ever foaled.

I have occasionally seen young human colts rushing gallantly over the track, and I have made no bones of asking trainers, "Why are such things permitted?" Some years ago there was a public exhibition of boys in an American city doing this kind of thing, and the Society for the Prevention of Cruelty to Children ought to have interfered. Fox and hounds I have not the least objection to. There are accidents of ground which necessarily slacken speed. Boys get their breath again, and no harm comes from such running. It is the tremendous work imposed on an immature organism which

hurts it. The consequences may not be immediate. What I am sure about is, that a break down is certain to come in the future. I have yet to see the fleetness in a lad of tender years with sustaining power. We race young horses, we force them by feeding. It is a money problem. We race horses as soon as we can, in order to get as speedy a return as possible for our outlay. If the horse breaks down afterward, he has secured his owner's purpose. I am sorry to believe that if it were possible to do the same thing with young boys, there would be men found who would work on such immature subjects, and find, too, speculators willing to abet such wicked performances.

For long-distance running nicer calculation may be brought into play. It may be made a hot contest from the beginning to the close. I have had champions tell me that never more than once, during their training for long-distance running, had they covered the whole distance at their best speed. They had done their utmost for three-fourths of the distance, and so made the time calculation of what it would have taken to get over the last fourth. It must be near the close of the training that the effort is to be made, but exactly when depends on conditions. Trainers rightly object to a man giving away his force when not called upon to do it. It is the saving up of the capital until the time comes to spend it, that they look to.

Men who run are very poor judges of their own time. They never should worry over it. They ought to have

their minds free from any anxieties. The longer race, however, does admit of brain work in the observation of one's competitors, and so conditions may be altered. But decisions have to be made with great promptness. When a man hesitates he is lost. A good runner, but a man who schemes too much, often "gets left." Training for running long distances differs in no respect from that for sprinting. Generally men fail from being too fine. This overworked condition, with the additional strain the man takes, does him the most harm. He may lose his place, not only for the event of to-day, but for a whole season.

Public taste rather favors sprinting. The reason is that it is a contest which is of the shortest duration. I openly confess a liking rather for the half-mile, the mile, and the three-mile run.

There is more knack in sprinting, so much being determined in the method of getting off. I have known men who were hard to beat for the half mile, who never could catch the knack of "the set," and, somehow having the personal equation slow, could not get away as quickly as they might at the pistol shot.

In the longer running race, if a man knows his gait, it is a good thing not to push himself hard until the finish; but then everything depends on the speed of those who run against him. The spurt at the close may be too late, and a man who has done his best from the first to the last will win. The professional may not make his run for time, for to be handicapped in the future is

what he is afraid of. The amateur ought to try and do his best all the way through. I like "cutting the pace."

A man who can cover his mile in five minutes and ten seconds has possibilities. Four minutes and fifty seconds is very good time. Four minutes and forty seconds is remarkable, and it has been done in 4:18 $\frac{2}{5}$ by the one man in the million. For the half mile the time ought to be comparatively quicker, and it is. The half mile in 2:12 is good, and anybody with that performance may trust some day to be among the illustrious. For a number of years 1:55 $\frac{2}{5}$ was the top notch, but 1:55 $\frac{1}{4}$ has been accomplished for the half mile.

A three-mile race calls for prodigious efforts. The man, to make a record, must be in a measure matured. There can be no sprinting in it. I think more than anything else, a three-mile race shows the prowess of the man, plus that improvement judicious training gives. I never want it tried by any one who is not sound from the crown of his head to the tips of his toes. The least wind defects tell.

Taking 4:40 to be a very good record for one mile, for three miles it ought to be about 14 minutes. But the single mile has been run in 4:18 $\frac{2}{5}$. The time made by the greatest runner, shows how distance increases difficulties. The best time yet recorded for the three-mile race in the United States, is 14 minutes and 39 seconds. In England 14 minutes and 29 $\frac{3}{5}$ seconds is the astounding record. Anybody who ever can run three miles in 17 minutes, may hope to do better things.

Men who run well, naturally take to hurdling. The obstacles to be cleared give diversity to the race. Though it looks easy, it is not every sprinter who can become a good hurdler. You must not only be able to run fast, but get the knack of managing your legs, so that in the jumps you do not impede motion. When the hurdle is cleared, how to have the leg you light on ready to take the impact and yet retain its force, so as to give the impetus to a forward move, requires great practice. If 120 yards on the level can be run in, say 13 seconds, or less, it is a very able hurdler who can clear hurdles by the addition of 3 or 4 seconds to that



READY FOR THE HURDLES.

time over the same ground. With 30-inch hurdles the jump is inconsiderable, and the effort of the hurdler seems slight, but when 12 inches are added to the height of the hurdles there is no skimming. Over a 42-inch barrier it hampers the even stride, and yet to make speed it must not do so. "Handiness" with your feet is a necessity. There is a great demand for skill in hurdling, much more than is usually accorded to it by the public.

Hurdles are put 10 yards apart. There are 10 of them. The run to them is of 10 yards, and the finish of 20 yards. The 120 yards and the 220 are the standards. Generally the two sizes of 30 and 40-inch hurdles are used, occasionally 36-inch ones. I have thought that the expenditure of vital energy in hurdling, though very great, was not, however, quite as severe as in straight spurting. If measured by the lifting power it would apparently be more, for the 10 additional rises of the man would have to be considered; but, nevertheless, at that rise there is some slight change in the muscular movement, which is of advantage to the hurdler, for physiologically the thing that tires most is the working over and over again of precisely the same muscles.

The ten 42-inch hurdles and 220 yards, have been covered in $26\frac{3}{8}$ seconds, and twice this distance with the same obstacle in $61\frac{5}{8}$. This last feat is a marvellous performance, approaching the speed of the best man on the flat. Not to lose sight of the physiological considerations developed in exercises of speed, I want to call attention once more to the enormous power of the legs and their endurance, and I refer back to the gymnasium where the education of the leg is to be recommenced.

Legs and thorax may seem to have no immediate connection, but they have. Try and run, or jump and leap with your ribs rigid or hampered, and it is an impossibility. No motion can be given to the leg that there is not development brought about higher up. We breathe better because we can run well, and inversely

we run better because we breathe better. No man runs well who has not commenced his apprenticeship in the gymnasium.

WALKING.

How may I write about walking? I have already acknowledged a certain amount of prejudice against it, but only in the respect that I think it occupies too much public attention, and men waste their time at it. No human being is there, knowing anything about walking, who does not openly declare that this performance on the track calls for an artificial gait. Now, whatever is "artificial" never can have any positive or fixed rules to govern it, so whenever there are walkers and walking-matches, there are constant disputes over the performers and their performances.

"What is that man doing? Why does he go along that way for, father?" I heard a lad of ten ask his father.

"I am sure I don't know. But really for a cripple, my boy, he seems to be going really fast," was the reply of the father to his boy.

One advocate of "walking" says something to this effect: "Oh, it's grand, and for this reason: After you know how to walk in what we might call an unnatural way, it is just splendid to walk in a natural way!"

For my own instruction, I have had professional walkers tell me what they considered to be the exact gait, what was the irreproachable style, and I never could get two of them to agree. I am led to believe that in one or two respects only, are men of one mind in regard to

what is fair walking. One is, that "only one foot must be on the ground at a time." Another is, that "the knees must not be bent when the feet strike the ground, but remain rigid until after they leave it." Now comes in a third rule, which is the source of many disputes, and it is the enforced one, that "the heel of the forward foot must strike the ground simultaneously, as the toe of the rear foot leaves it." I have sometimes thought that I never saw in my life but three pedestrians who honestly kept to these rules, and they were not professionals. I do not tax those who have made records with unfairness, but unwittingly they do get every now and then outside of the rules.

I have seen many amateurs who thought they were walking, and were walking naturally it is true, but unnaturally as far as athletic ordinances went. To patent walking would be like the invention of that ingenious man Dean Swift describes, who made a knife to cut cabbage with, which would cut it better than anything else, save a common table-knife.

"Heel-and-toe" walking is the common name for such performance and is used for want of a better one. To walk with a hip juggle is the common designation. I do not hesitate in calling it an astonishing performance. There being 1,760 yards to the mile, a man to go his mile within the 8 minutes, must cover 11 feet each second, or about 220 yards the minute. That is just a step of 11 feet a second. I give this, as does the general public, the highest applause, but I think, as do many who have a knowledge of this business, that it is only

those who have studied this artificial gait who know the difficulties of it. It is "a technical pleasure," which only the Anglo-Saxon race has been educated to appreciate. As to grace, it is the very opposite to it. The walker must take poses which imitate those of a machine. If he does overcome, in a measure, the right and left graceful sway of the runner, his compensation is to bob up and down, diminishing with an effort this horizontal movement by means of his hips. He runs off his level at the waist.

I do not decry walking. I cannot see anything hurtful in this exercise, only I am positive that walking has been carried to too great an extreme. The public is appreciating the walk less than it did. As a recent writer expresses it, "the high-bred sprinter" excites the spectators; the "common horse-gait" does not. Some of these walking performances are wonderful; a mile with all this hampering has been made in 6 minutes $29\frac{3}{4}$ seconds; two miles in 13 minutes $48\frac{3}{8}$ seconds; three miles in 21 minutes $9\frac{1}{2}$ seconds; five miles in 38 minutes $\frac{5}{8}$ second; seven miles in 54 minutes 7 seconds, and ten miles in 77 minutes $40\frac{3}{4}$ seconds.

The fatigue of such performances is very great, and the best training is a necessity. The endurance of the man must be brought to its highest pitch. The use-up after the performance I have thought was excessive. I shall lay myself open to be called a man with a prejudice, but I cannot help thinking that a pedestrian is a man wasted, and I repeat the maxim, that "the play is not worth the candle."

CHAPTER XVIII.

TRAINING FOR THE RUNNING HIGH JUMP.

THE jump is the most specialized of all athletic performances. I can imagine of nothing in a physiological sense, which required exactly the same concentration of movements. With the jump, if it be the record-breaking one, comes that electric discharge of acquired, accumulated, or stored force, the effects of which Pflüger calls "the nervous avalanche." In a previous chapter I have presented at length the advantages derivable from the gymnasium; the champion jumper gives it the weight of his experience. Mr. Page writes:

"The first thing is to get strong, and a boy must attend a good gymnasium, placing himself under the care of the superintendent, who will direct what exercises he requires, and how long he shall work at each kind. Boys are apt to overdo exercise when left alone, and nothing is so detrimental to athletic success as this, for it transforms tissue that should be healthful and somewhat fatty into hard muscle, an unnatural development for young boys. A competent director will decide when his charge has had enough, and a year's work in a well-conducted gymnasium will make out of a sickly boy 'a sound, sane youth.'

"The high jump being special work, particular atten-

tion is to be paid to vaulting over the bars. All tendencies to become jammed about the ankles, the knees,



A FAIRLY STRAIGHT JUMP.

and the hip-joints should be evaded. You do not always work in a gymnasium to strengthen certain muscles, as much as to stretch and limber others. It is not rapid but gradual training which brings about the high jump.

“The training, as far as food and rest go, is the same as for any other exercise. When working in the open air, no over-exhausting trials of strength are permissible.”

Mr. Page thus describes his method on the day of the contest :

“ I rise late and breakfast at ten o'clock. The meal consists of a good portion of porridge, followed by as many chops or as much beef-steak as may be needed, but no fluid except the milk on

the porridge. During the remainder of the morning I take another meal, consisting of a slice of beef and a bit of toast without fluid.” *



A SIDE JUMP.

* *Harper's Young People.*

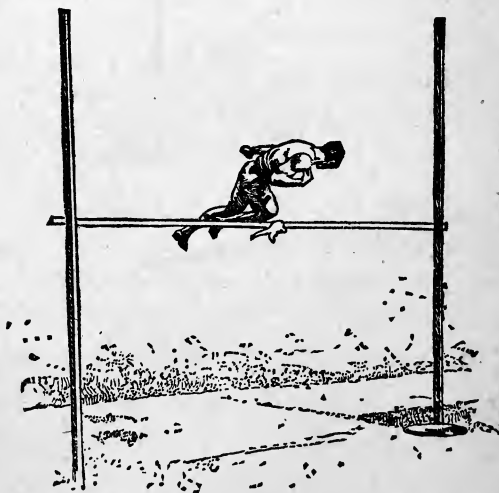
Before the work the man is rubbed down and prepared for the contest. To fuss about anything which could have been attended to before is to waste energy. What is to be done is to save yourself for the supreme moment. There is a knack in the high jump, and this



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THE START.

skill never comes but with long work. It all lies in perfect muscular adjustment. Style and elegance alone



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EASY STYLE IN A LOW JUMP.

exist when everything acts in unison. Mr. Page's final expression is one worthy of remembering, and it is, "that

a man should do his best," for it is far more honorable for an amateur athlete to show a fine performance, than to win all the prizes in creation by means of doubtful handicapping.

I favor slight sprinting for jumpers in order to bring about limberness and spring, but distances must be



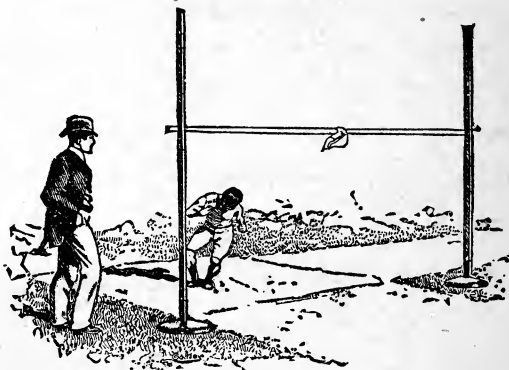
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HORIZONTAL POSITION WHILE "SHOOTING" ACROSS THE BAR.

short, and the runs at long intervals,—not more than three times a week, and only one in the week when the event is to be attempted. Never try the high jump without spikes.

The fling of the body, the twist, when the man is higher than the bars, takes a great deal of practice. A man does it without trouble when vaulting by using his

hands. The thing is to try and do without any manual help. Working this with a low jump is not so easy as it seems, because the time of the rise is too short for



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LANDING IN GOOD STYLE.

the fling of the body. Begin with a fair high jump, high enough for the parallel motion of the body with the bar, to be carried on at the same time. It is an art



READY FOR THE TURN.

to do it neatly without scraping the bar. To turn facing the bar is not so hard. Try so as not to fall on your feet too squarely. You can always recover and face your jump in good time.

In an instant the good

jumper has resumed his upright position.

In looking at the high jumps, what I have tried to understand most was the preparation,—the take-off. If

the run is too long, the jump is lowered. The effort is upward, horizontal, not so much forward. The foot—the left one—gives not alone the impulse, but the spin which is requisite, and the more amazing does it seem when we consider that it is in no small measure the foot and the one leg which fire off the human rocket. There is some question as to how many different movements there are in a high jump,—certainly twelve of them, if not more.

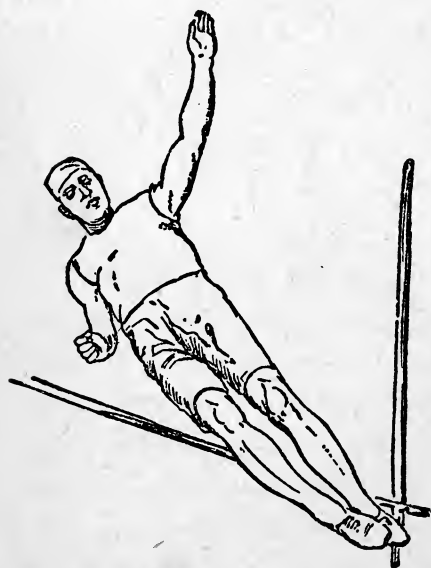
CHAPTER XIX.

TRAINING FOR POLE VAULTING.

TO use the pole in vaulting requires not alone the utmost elasticity of the legs, but at the same time great arm power. The movement is complicated. First, there

is the natural spring of the man, plus that of the pole, and at a certain moment arm power is required, which permits, as in the English style, of the man's climbing up the pole. Pole climbing is rather the English than the American method of surmounting the difficulty.

The best American pole vaulter never changes the position of



OVER THE BAR.

his hands after he has his hold on the pole, but he does lift himself over by its means when he is in the proper position. When the hands of the champion Englishman leave the pole, they are from three and a half to four

feet higher than when the first hold was taken. The English record is two inches higher than ours, and their method, though not so pretty, is perfectly legitimate.

Eleven feet and seven inches is a prodigious jump. With certain improvements of the pole, such as giving the points where it takes the ground a tripod form, greater heights may be scaled. This work requires the utmost nicety of execution, for with the least hitch or want of co-ordination a fall, and a heavy one, is common.



LETTING GO OF THE POLE.

The training is not special, only greater attention must be paid to the muscular development of the arms and chest. Together with sprinting, there should be a good deal of work given to the arms and muscles of the back. As in all these special performances, to over-train is to spoil a man, yet constant practice is a necessity, and just here lies the dilemma. Save yourself, and the sleight-of-hand of the thing escapes you. The only way is to keep working at such lower heights, which do not call for the whole of a man's powers. He must keep his supreme effort for the time when he is to do his best.

It is worth mentioning that in some of the older countries, as in France and Holland, the long jump with the pole (not the up jump) is of very ancient date. Where small brooks and rivulets abound, or even canals or ditches, poles have been used from time immemorial by shepherds and hunters. A new sport, and not an uninteresting one, might be presented in this direction.

CHAPTER XX.

TRAINING FOR CYCLING.

I BEGIN at once by the statement, that more young men are damaged in a physical way in cycling than by any other athletic performance, for want of training. That speed which is kept up without consideration as to stamina, too often ends in a break down. It is not so much the green-horns who go to pieces, as men who having trained, stop work, and then without any precautions go in again. I have tried to study particularly the causes for this use-up and failure, and I am of the opinion that rigidity of the arms, the somewhat over-strained position of the abdomen, with great expenditure of force from the waist downward, bring about the trouble.



The perfectly trained man feels no more inconvenience from sharp or protracted work on the wheel than from any other athletic performance; but the half-trained man is sure to suffer. The bicycle, as I have heard a well-versed athlete describe it, "is Circe." By that he

meant that the exercise is so delightful, that it leads you on and on, and then you suffer, before you know how it happens, from its blandishments.

These remarks are intended, of course, for those who put themselves in training for a race, and not for those who jog along country roads. Even to these latter Dr. B. W. Richardson gives a word of advice. He says that all riding which tends to bend the body forward must, if continued, "produce stooping." This excellent authority insists that when amateurs ride, one mile in every eight ought to be made on foot; or that in a fifty-mile excursion with a bicycle, a man should walk at least six miles.

In training for cycling, I particularly advise a great deal of work, without any machine at all, especially at the beginning. The right method of how to ride must have been acquired long before. A man should take a sharp forty minutes' walk every morning and sprint occasionally. If he is on the track with the machine later on, say at midday, he may take not more than an hour's work, and though he may run at a good speed he should refrain from doing his best. When he has been rubbed off, bathed, and dried, I advise his doing nothing at all until the afternoon. Then he ought to be in his prime condition and able to face big work. He may then try for speed, still not giving himself entirely away. The instant he feels breathlessness, that moment he must put on the brakes. Slowing up he recovers. He can then try a fast spurt again, arresting motion the instant

distress is apparent. He should make these tentative efforts in order to see for himself what is his condition. In a few days he ought to experience little trouble with more speedy recoveries.

I have said that the position of the man on the bicycle was one of constraint. "Always sit straight" is a rule found in every book, but this position is rarely followed. "Hold the body still and sit down," is another canon of cycling which is not often observed. See any print of a cyclist on the full go, and the artist sits him like a jockey. Look at the next bicycle race for yourself. The man cannot go fast in any other way. The abdomen is compressed and folded in, and if that position is to be retained to accomplish the work, it requires special education. Plying the pedals so as to be master of the machine and to get every second of speed out of the wheel, is given only to the few.

In my own experience, I am certain that I have had more complaints made of pupils "feeling badly after hard cycling work," than from any other exercise. I have seen good results from having cyclists take an intermediate course of such exercises as would develop the muscles of the back and chest. I have tried to straighten out the curved upper portion of the body and to flatten the stoop. I do not mean to say that I am infallible, but just as I can almost always spot a fencer by the unusual development of his right shoulder, and strangely enough a depression of that side, so can I indicate the cyclist. He is good from the waist downward, and

nothing like as good from the waist upward. He has a little crook forward. This only tends to show that the man is plastic and moulds himself to his apparatus. His form fits itself to its requirements. A great cyclist would not be great if this was not the case. It is the selection of the fittest.

I should fail in my duty did I not give my opinion as to the effects of cycling on those who, having made records, are inclined to indulge in too many performances. I think they use themselves up more rapidly than any other class of athletes. Dr. Richardson may not be an expert in training, nor as well acquainted with the events of the track, as the reader, but he certainly is a physiologist of great distinction. He writes in regard to cycling, not in a general, but in a special way, directed toward those who make or break records: "They are exhausting their capital stock of vitality, and that there is no going back for more capital, no making up by rest prime loss from the original capacity."

I may be brought to task for giving my opinion about cycling, but what I mean is this: That there must be moderation in cycling. I believe with the best of English authorities, that the intervals between events are too short in the United States, and that in their contests, often repeated, men are spoiled. I have endeavored in a measure to account for the peculiarities of the bicycle. I am right in a physiological sense. The same movement is repeated over and over again with the utmost celerity, which is just the thing to call on local-

ized muscle for all it can do. That condition, it may be said, follows many other performances. To this I give my assent, but I add that neither in running nor sprinting is the position of the body constrained. You always want as much wind as you can get with open draught and furnace capacity, and when you have to stoop double and choke the flues, as when cycling, it is that which brings on the troubles.

There ought to be a rule of age adopted by athletic clubs, which would prevent any one competing in a race for even a single mile, who was not of age. I sum up what are the advantages of the bicycle. Under the supervision of a doctor, I have used it with marked advantage to develop the leg of a child, where there was one limb showing a decided tendency to shrinkage.

In moderation for the business man, I know of no exercise tending more to dissipate the trouble of sedentary life than the bicycle. Excess of anything is to be deprecated, and because cycling is the most alluring of all outdoor exercises, I have wanted to show the harm which follows the abuse of the wheel.

TRAINING FOR BASE-BALL.

Good all-around qualities are necessities for the baseball player. He must not only be strong but swift. Distances between bases are short, but considerable speed must be shown in covering these. General running, with sprinting, brings of course fleetness. The apparatus to induce strength of arm, and the increase of

particular muscle for throwing, are well brought out by the use of the rings, and particularly by the "spool." This is a piece of hollow wood, strung on a rope, which rope is stretched from about the man's shoulder to the wall, the incline being fairly rapid. By repeated use of the spool, the art of throwing a ball is acquired. Dumbbells, clubs, boxing, running,—all help the base-ball aspirant. Practice in wire cages so as to pitch, is only good up to a certain point. Winter training as special for base-ball amounts to a great deal.

CHAPTER XXI.

TRAINING FOR OARSMEN AND SCULLERS.

TO give the uninitiated ones any of the instructions common to Yale, Harvard, Cambridge, or Oxford, as to the art of rowing, would be to make them demented. Take the first direction, "to keep a stiff back and row"; that alone would seem impossible.

The scope of this work is not such as to lay down the methods of rowing, but it ought to show what are the muscles called on in pulling an oar. Mr. William Blaikie brings out in a striking manner the fact that rowing does not develop the man, in that all-around, general way the public supposes. The position is one which tends to cramp the body. It does call on certain muscles for all they can perform, and has no use for others. Remembering the law that development follows stimulation, as effect does cause, we have then the construction of certain muscles, and the destruction, or rather the lessening, of the growth of others. A rower's arms and back are not always good, especially the upper arm, while legs and thighs have increased strength and bulk. The English rule of the scientific school of the oarsman, is that the biceps must not do the entire work, but that the shoulder muscles should give their power

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too. In the best school of oarsmen there are twenty-seven distinct movements.

I have never known anything akin to deformity arise from over-rowing. Cases of vital exhaustion may happen, but such would occur with any exercise. I do not look then for any great power in an oarsman's arms. The biceps are certainly not prominent, but where the increase comes is to the extenders of the vertebral column. If there was a mechanism which would distinguish between arm and leg power, in scientific rowing (all the apparatus of stretchers and sliding seats being in use), such mechanism would inevitably show that most of the power came from the loins. Lagrange intimates, that if after a long rest, an oarsman takes to his work again his arms may tire, but it is his legs that hurt him. I think this shows which portion of the system has been most taxed. I am certain that the astounding power of a great oarsman who pulls alone (not making one of a crew), and above all his endurance, arises from the fact that, though he moves like a machine, it is the necessity for constant change of position which keeps him up. Examining the action, the vertebræ never are jammed. The chest may be at one moment of the pull some little compressed when a man rows alone, but that only happens for the briefest interval of time.

In the study or analysis of the principal movements, not for rowing alone, but for all other exercises, I have wanted that the physiological or body conditions should never escape me. If we can understand them, we can

make up the defects arising from either the want of strength in particular muscles, or if they be over-developed by particular work, how best to modify them.

TRAINING FOR BOATING.

Taking the collegiate as the type of material, it is excellent. It is supposable that the man who aspires to row in the College boat is neither indolent nor has acquired bad habits. Necessarily, he cannot have the hardihood to assume such a responsibility as being one of the crew without having been through the gymnasium. Generally the young man has been rated by his mates, and his all-around proficiency has been gauged. It is raw material capable of improvement.

The coarser methods of training employed many years ago were driven out of the field when this better element was presented. Personal differences in the individual will, however, always remain.

The men of the crew ought to be out of their beds by 5.30, if in June. If it be in May, by 6 o'clock. They ought to have had their full eight hours' sleep. If some want a half or even a full hour's sleep more, let them go to bed earlier, for there is to be no sleeping in the day. As soon as men are mustered, they should have a piece of stale bread and a half tumbler of milk. The men should take a brisk walk of a mile, or a mile and a half, before breakfast. Any running should be then strictly prohibited. On returning to quarters they should have a good sponging off with cold water, fol-

lowed by a sound rubbing. It ought to be now eight o'clock, and the nearer to eight the better, and breakfast should be ready. This is a serious meal. The men may eat beefsteak or mutton chops, not rare or over-done, but just about middling cooked. Bread ought to be stale, and that stale bread toasted and eaten cold. I do not limit butter, and never exclude it. I do not want to stint food in any way. I have not the least objection to berries. I limit the fluid and its kind, and it should be tea, and that not too strong, with or without milk, and never more than two moderately-sized cupfuls, to be taken at one time. I think sugar makes no difference. I do not give eggs for breakfast, boiled or fried, nor in an omelet. I would very much rather see a man eat heartily than the contrary. I do not believe that after Milo had carried his four-year-old heifer, he ate it all up; but certainly he ought to have had appetite enough to polish off a good deal of beef.

The midday meal, because the most serious work of the day comes after it, must be light. I am afraid of over-taxing the digestive powers of the men. The midday meal may be a mutton chop, a beefsteak—not as much in quantity as at breakfast—with a salad. Bread always must be stale. Beverage should be water. I make it a point to have meat at the midday meal. When the work is over for the day, then comes the sponging and rubbing off, and the crew is ready for dinner. Excepting that all greasy or high-spiced sauces are absent, and that the bread is stale and there is rarely

any wine, the dinner may be pretty much like anybody else's dinner. I think roast meat as good as broiled. I see nothing objectionable in having fresh fish or chicken. Vegetables may be of all sorts. Men are not inclined to make their dinner on potatoes, as a general rule, but green vegetables are what are wanted. At dessert there are to be no puddings nor pies, but fresh fruit if it is procurable; or if not in season, stewed canned fruit. Some of the English crews have calves'-foot jelly at dessert. If this is made from the feet, there is nutriment in it. If manufactured from gelatine, it is perfectly useless as food.

I like to have my men accustom themselves to tea at dinner, and think I have noticed general benefits arising from its use. Not more than two cups of tea should be taken at any meal, or two tumblers of water, and never ice water. At the beginning of work I have seen real distress arising from thirst. If this is evident, I have increased the quantity of fluid to as much as twice the above-mentioned amount, then gradually diminished it to the prescribed quantity. I have never given ale or lager-beer, because I have a wholesome dread of boils.

Now, as to the exceptions to this regimen. Two years ago I commenced giving a man, who wanted tone, a little sound French wine, mixing it with water. It did him an immense amount of good. I can almost say I noticed improvement within twenty-four hours in this particular case. Then, of course, the rest of the crew wanted red wine. The stock of Burgundy gave out and

a sound California wine was substituted for it. This was certainly a heavier wine, with more alcohol in it than the French wine. I could see no bad effects from it. I am not so tied to an opinion as to insist that it did not do the men good. If visible conditions were not improved, at least I thought I noticed at once greater alacrity for work.

In recent works on English training, not for rowing exclusively, but for all kinds of work, I think the use of light wine in moderation is becoming more general. I see no reason why it may not be given occasionally. Sherry and Port I never would give countenance to. As to whiskey and brandy, it is simply impossible for a man to train who uses them. A work on training is not a temperance book, but nothing inculcates moderation more positively than those processes necessary in order to bring men into the best condition.

I do not see this recorded in books on the subject, but for exhaustion, minor cases of collapse, especially after the race, the very best thing I know of is champagne. I notice in recent volumes of African travel that when the explorers have been brought to a standstill, they all vaunt the magical effect of champagne. After the event, then, some little champagne can be taken; in fact, I endorse its use as a restorative.

Occasionally, but not always, just before going to bed men may be hungry. It is perfectly well known that hungry men never sleep well. If there is anything I do want, it is that men going to bed shall sleep like logs.

A crust of stale bread and a tumbler of milk will often then be found of great advantage. I may say there is a stupid prejudice against milk, which arises entirely from ignorance. Milk holds in solution all the substances of beef or mutton. I do not want to make men work on infants' food, but a little milk does good. I believe in giving it at night before men go to bed, and its use is of advantage early in the morning. It sustains while the work of early morning goes on, before a regular meal, and at night it arrests that hunger which disturbs sleep.

There is nothing easier than for a man to accustom himself to cutting down the bulk of the fluids he uses. The drinking of very cold water is the one thing that helps more than anything else to bring on dyspepsia. There can be no greater arrester of digestion than ice-cold water. Remember that all you have swallowed has to be brought up to blood-heat before digestion can take place. The solid food you have eaten is influenced by the cold water you drink. Until it gets up to the general body temperature, normal functioning stops. To warm it up you must expend much vital energy.

There must be no smoking nor chewing. For the man in training, Cuba, North Carolina, Virginia, and Kentucky might have remained undiscovered countries.

I need not advise against the use of medicine of any kind during training. If a man is ill he must acquaint his trainer with his condition at once, who, if he be wise, will send for a doctor. I have before warned men

about dosing themselves, or being dosed, before training. This habit arose because in the past, athletic exercises were mainly carried on by men who had no control over their appetites. With gross and coarse men inclined to drinking and debauchery, it became a necessity when they were trained to wrench them, physically and mentally, from their prior unfortunate conditions. Hence the purpose of a "black draught," as Morrissey advises.

Utter abstemiousness from liquor was promulgated from these former unfortunate conditions. This was in the time when there were no amateur athletes. "Rule of thumb" often exerts its sway; and methods of training have in some cases been continued which have no good reasons for their existence to-day.

The twenty-four hours may be divided into the two parts of sleep and work. Sleep and the preparation for it not being less than nine hours, there remain fifteen hours. This cannot be used for work entirely. Now, there is the widest latitude given in various systems of training, as to the time which should be devoted to work. Much depends on the original condition of a crew. The greatest amount of work any men who are to work in a boat can stand with profit, is four hours. Beyond that there is no advantage. I am very positive that four hours is excess of work, and inclined to make men stale. I think three hours in a boat is ample. If in the three weeks', or even six weeks' training, a man has not by that time learned how to acquire skill with

his oar, he is the duffer—better out of the boat than in it.

The question a trainer must ask himself is this: "Am I working these men for skill or for strength?" It is supposable that both skill and strength do come by practice, but rarely in equal proportions. With the fine material at hand, the condition of the men being favorable, and giving them credit for intelligence, I think that under such care as they receive, strength comes more readily than skill. To acquire all the points, it takes more time than the six weeks or two months usually given to getting the men ready. I should advise then with a good, strong crew, to bring them up early to their condition. But here is the rub, and it is to keep them there. It always is difficult to have precision of stroke without some loss of power. It is not a question of how fast men can go, as how steady they can work. Put on the speed then slowly. The time must come, however, when about what is the speed the men can make has to be known. About four days before the race the course must be covered at the best time. After that, work of this kind ceases, otherwise the crew are likely to become "stale."

Here comes in something in regard to which the best and most observant of trainers, coaches, or coxswains are at sea. Say the course has been run on a trial on satisfactory time. Will the crew repeat the time, or will they do better? I have made many mistakes about this. As often as not the time of the actual event has

been slower than the trial. Occasionally, but not often, very much better. I think on race days some men display a nervous energy which is amazing; while others, with something akin to mental disturbance, fail in every way. Sometimes the advice is given to feed sparingly the day before the race. I think this advice to be hurtful. On race day I would watch more closely than at any other time the dietary of the crew. If the race is in the afternoon, I would make no particle of difference, only as to quality. If it be at midday I even want the men to eat a good, hearty breakfast.

This general idea of training for boating has its bearing on getting men into condition for almost any kind of exercise. It is not special to boating.

I use the scales, but not every day. I must know a man's weight at the start. If he be over-fat I expect him to lose some of it. I am uneasy if the fat man goes away too fast and keeps going. Men of moderate build I expect to weigh a little more before I am through with them. Not that they have gained fat. They have gotten rid of it. They have taken on muscle and condensed their bones. Why should empirical laws be given about these things? The way to increase and diminish a man's weight depends upon work. I can reduce a man until I kill him.

I am not prepared to say what shall be the perfect weight of a man of 5 feet 6, or of a man of 6 feet. It varies according to conditions. Take boat crews that make their records, and their total averages differ a

great deal. There is no rule which gives me the infallible "tip" of weights and winners. With the horse the added weights tell, but not with the man, for he ought never to be handicapped in that way. In the record of any season, not of this year alone, but of the past, it will be seen how weights of men vary as to size. I do know that a crew of dwarfs could not win, and I am almost as certain that a crew of giants would find themselves nowhere with men of normal size.

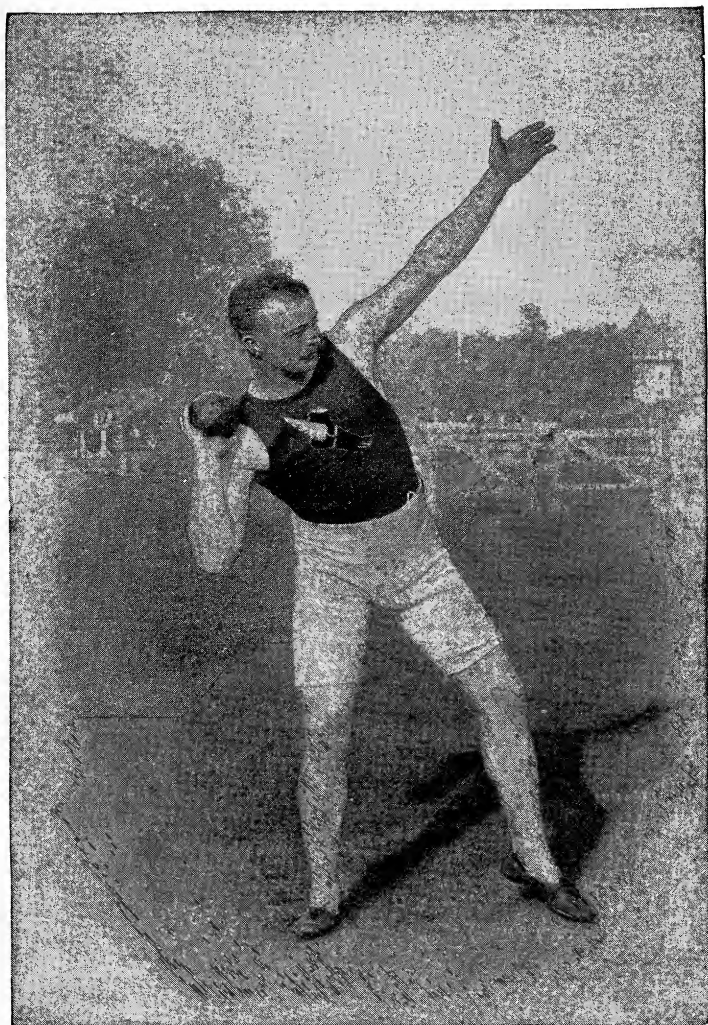
When two oars are used by the man, the exact amount of work done is by no means greater than when both arms are applied to the single oar. In many respects, however, sculling has certain advantages. The sculler is his own master and can regulate his own method. He is not necessarily subservient to the command of another, and is not forcedly automatic. Though in the race he must exert himself to the utmost, he has his own methods of relief. How to make slight changes of position—these acquired by long practice—is one of the arts of sculling. If not as automatic as were he one of a crew, the sculler has to exercise more judgment and has to call on his mental powers. It must not be understood that the power of thinking is in antagonism to muscular movement. The work being then less monotonous than in pulling with a crew, the sculler has some advantages considered here only as motive power. The command of himself does not, however, always tend toward his benefit. Pretty generally amateurs lose races through their own want of judgment. Want of control

makes them overtax their energies at the beginning, and they are spent when three-quarters of the course is rowed.

The question of training is of all importance in sculling. I am of the opinion that in the carrying out of all the work of the athlete there is nothing that tells as much on sculling as condition, and the worst thing is to train down too fine. In the delicately constructed boat of to-day, fractions of inches lower or higher in the set of the craft in the water makes differences of feet in the progress of the race; but that is of secondary importance to the status of the sculler.

I would rather have a man a little over-weight from his training, if he is to pull a pair of oars, than too light. There are so many collapses brought about from having a man "stale" before he begins serious work.

A sculler ought to take his own time under favorable and unfavorable circumstances and so get his average. I should not care for his trying to do his very best but once during his actual training, and then, if possible, four or five days before the event comes off. This is something not so easy to carry out, for the surface of the water is rarely exactly the same. A lumpy river is much harder to overcome than a heavy track. Let him take, then, if he can hit on it, the most favorable conditions for his own particular trial. As he never ought to be without friends, these ought to consider what are the exact directions of the wind and tides, which may vary every fifteen minutes, and so correct his time.



From The Illustrated American.

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GEO. R. GRAY, PUTTING THE 16LB. SHOT.



Brute force will win an occasional race, but the majority of the scullers' triumphs are due more to skill than sheer strength.

From using both arms equally, the general development of the sculler is better than that of the single oarsman. I have rarely seen a sculler who had not a fine chest, but with Mr. William Blaikie, I, too, have noticed more than one who, good at the single oar, had chests which were unmistakably poor.

CHAPTER XXII.

WORK FOR HEAVY MEN.

WHEN a man can show a 39 or 40-inch chest, and a 15-inch biceps, and will scale from 180 to 200 pounds, then let him go in for such heavy work as putting the shot, throwing the hammer, and the tug of war. Men



THROWING THE HEAVY HAMMER.

who are up in gymnastic work generally know what are their limitations. Physical build determines the selection of the things to be done.

As I have before explained it, Nature says early, this lad when he grows to be a man will be a sprinter; that

other one will be a mighty putter of weights, or the "anchor" of the tug of war.

Endurance has some little to do with the making of men who gain merited renown as heavers of hammers, but like in the jumper, it is the intensity of muscular development called upon at a certain time to come to the front, and to carry out some prodigious effort, which tells. No man can do any of these heavy tasks who is not mature. Strength is one thing, actual weight of the man who throws the hammer, or puts the shot something more, and skill counts for a good deal. These want for their proper management "big and bra' men." No stripling in his teens who trips like a deer over the turf, can stand a chance against these adult human catapults. When a man has to take a hickory or oak stave, capped with a 16-pound mass of iron, and send it over 90 feet, the force, the skill of the performance can be appreciated. A hot ball shot in by a fielder has its merits, but what of the weight of this mass of iron, as it comes like a skyrocket through the air?



From Harper's Young People.
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PUTTING THE WEIGHT.

There is more knack, probably, in hammer throwing than in putting the 56-pound weight, but as to main strength, both these performances call on the athlete to have an abundant stock of it. No one would suppose for a moment that there was anything like a correlation

of action between the high jumper and the hammer thrower, but in a physiological sense there are close resemblances. To clear 6 feet 4 inches from the ground, or to throw a 16-pound hammer 123 feet $6\frac{3}{4}$ inches, require that every muscle in the man shall tend toward the accomplishment of these two feats. It is because the hammer thrower or shot putter has the help of his heavier avoirdupois, that he puts that, plus his superb muscular development, all into the mass of iron. The resultant is the propulsion of the iron to its last inch.

When the man jumps, it is his own body that he cares for. He is lighter in proportion as to weight, but his muscles are all-powerful. That represents, as far I can make it out, the reasons for the differences of build in the kinds of men.

The heave is a fairly prolonged act. The man gets the swing by turning on himself. Every muscle, from his neck down to his toes, extending to the tips of his fingers, performs its duty. I have been sometimes told that "elasticity of muscle was quite unnecessary on the part of the shot thrower." This I deny. The least stiffness shown by the shot thrower would check movement. No one can refine on this muscular play, and it is nonsense to tell me, "that it is not necessary for the heaver of the shot that his muscles should move quickly." This is assuming a knowledge of muscular development not discoverable in the scientific study of the subject. I grant that the physical education of the man is such that rapidity of movement does not seem necessary,

and yet here is the mistake. If anybody supposes that the champion hammer thrower is as deliberate in his movement, as is a languid young lady plying her fan, he is very much mistaken. The character of the performance precludes such an idea. Centrifugal motion has for its one element that of speed. A slowly revolving wheel never does fly off its centre. Rapid circular movement takes, when interrupted, the tangential line.

The muscles move as quickly as they can, and the hammer and its handle spin in the air, if not as fast as a drum-major's baton, at least with great speed. Some men may have a slower action than others, but it is generally conceded with adepts throwing heavy weights that it is best accomplished when celerity is used. "I can be so slow," said to me a champion, "that in the preparation of putting the weight I can use up and waste force. It is like slow burning powder; too much fizzle about it. I know what is meant by overcoming the inertia of a thing. At the very instant I clutch the hammer handle or the weight, I do not use much exertion, but I try and accelerate motion after that. I throw with a gradual increase of movement, otherwise I never could get distance. Now, do not understand that



POSITION FOR SIDE THROW
56-POUND WEIGHT.—LEFT-
HANDED THROWER.

there is not a limit as to speed. If I were twice as strong as I really am, I might be able to put in a more rapid motion, and at the same time not lose control, but being only an ordinary man, I regulate my speed to my power, but it's quick. I never have had to watch out for my leg development. They always seemed to take care of themselves; I do not, of course, pretend



PUTTING THE 16-POUND SHOT.

that my make is the same as other men. Where I have worked hardest was toward the development of the muscles of my abdomen, waist, and back. If you ever write about this particular line of work, which is not well understood, tell your readers that it is all nonsense that a weight heaver is not a supple man. He must be

limber, or he becomes jammed up at once. I am not more in love with my specialty than with any other. I sometimes think that I would rather have made a record in other directions, but this I am positive about, that it takes a man sound to the core to gain proficiency in hammer throwing. The extra inches that tell come from hard work, constant practice, and a limber back. Don't forget the limber back. General all-around development is what I try to get at, with special pains to approach to the supple spine the cat has."

Of the two, hammer or weight throwing, I prefer the first, for though there is art in both exercises, the first calls skill more into play. The development of the man is, too, generally better. As to style, it does not enter into the province of this work to expatiate on it. When a man throws the hammer, and does it well, there is nothing awkward about it. With art he hides the difficulties of the performance. To train for weight throwing or hammer putting, the preparation must be perfect. Though but a few seconds of a minute is all the time necessary to make a record, this only can be obtained after months of hard work.

Beginning with exercise in the gymnasium of a general character, particular attention is to be given to such work as will increase and strengthen the muscles of the back and waist. Waist muscles, I think, are built up rather slowly, and so progress may be apparently tardy. I have found for the biceps that the wheel was invaluable. There is an upward movement of

the forearm which is called upon when a weight is to be thrown, which under other circumstances is not often worked. I would, of course, keep up the legs, but not give them additional duty. They take care of themselves.

As to diet, it should be generous. Big men really do not eat any more than those of sparer build, but I think their inclination for drink increases. Now, a little common sense here is worth more than any quantity of theory. If I have a small lot of ground to water, I fill my watering-pot once, and that suffices. But the same quantity of water will not do for a garden bed twice the size of the first one. A big man has more area to supply with water, and consequently wants more, and then, too, with increase of surface, he must have a broader evaporation. It stands to reason he requires more water than a thin man, and the bigger bulk ought to get it.

A man begins with the weight he wants to throw, but restricts himself as to distance. Gradually he approaches near to his best, always restraining his powers. I know of no exercise which calls forth more patience than hammer throwing or weight throwing, nor one which brings with it less hope of success at the first. Strength acquired by good training does tell in the end, and skill is acquired. Do not attempt to lose bulk. I should advise constant use of the scales for this special exercise. If the diminution is too rapid, slacken off the work.

Hammer and weight throwing is the work cut out for

big men. A 200-pound man is really not a heavy man for the exercise. A noted champion will stand 5 feet 9 and weigh 210 pounds, and such tremendous proportions as 6 feet 4 $\frac{3}{8}$, and 240 pounds are claimed for the giants. I know no limit of time to be cited as fixing the period of training. I am inclined to believe that it must be continued over a long period of years before perfection comes. Public taste does not run toward mountains of flesh, but no one can become a weight thrower who is not built for it, and then, in addition, has improved natural conditions, by constant and judicious training.

THE TUG OF WAR.

As to the status of the men for the tug of war, the conditions do not vary a great deal from those of the weight throwers. A team of four of 700 pounds is none too heavy; a 635 one is rather too light. I think the resistance of natural dead weight helps.

There has been some inclination on the part of American athletic associations to give rather the cold shoulder to the tug of war, as it has been alleged that men are often hurt in such contests. If I were asked my opinion about it, I should very certainly join with those who do not encourage the tug of war. I might even incline toward its abolishment. I have always thought that athletes giving themselves entirely to this contest, were men wasted. I have known men who were very badly hurt in the tug of war. The strength of the chain depending on its weakest link, I have seen this weak link

break, and that breakage was a bad internal lesion. The reasons why it is dangerous is because, differing from a boat crew, where if a man in eight or six does cave in, his boat loses; he himself is only for the moment discomfited. In the tug of war, the strain being on the four men, and not on the apparatus (the boat), one man may suffer. Professing to show what are the advantages to be derived from manly exercises,



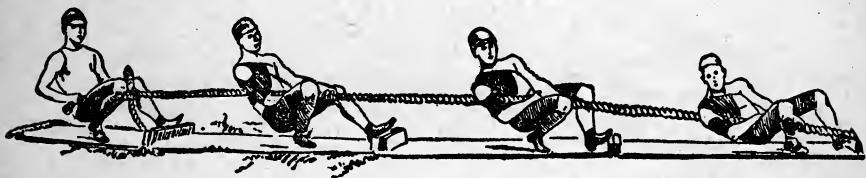
TUG OF WAR—OLD STYLE.

I see nothing that is good in the tug of war, and I believe that I am not singular in this respect.

Picking out the athletic associations in the United States who have crews who make the tug of war their specialty, the individual improvement in a physical sense, of such members, is generally null. I am not prepared to make the statement that the condition of the men had been lowered, but from such information as has been furnished me, it looks as if the loss were greater than the gain. I know there are exceptions, and men who have been of the tug of war have improved, but there are sometimes exceptions to rules. Is the

tug of war worth a rupture? In the older ways of preparing the ground for the pull, there was less danger to the men than there is now. To-day the idea is advanced that with the later appliances there is no danger. Cleats, I think, rather increase chances of hurt. If this contest must be continued, I like better the old method of work, which was of man to man. Then the personal skill of the one athlete is more quickly perceptible, and risks diminished.

I should never allow the tug of war to be tried in any gymnasium under my control, and until its advantages



A FULLY EQUIPPED TEAM ON CLEATS.

are more clearly defined, I never would. If there has been a revival of this so-called pastime during the last few years, the same reasons that took it out of the list of athletic performances in the past continue. As the mechanism has become more complicated, danger to the men has not been diminished. In a physiological sense, looking only at conditions arising from the tug of war, I am certain that nothing could be imagined which is worse.

It wears out muscle by strain, and continued strain, with no chances of recovery. I may be brought to task for this opinion, but I honestly believe it blunts a man's

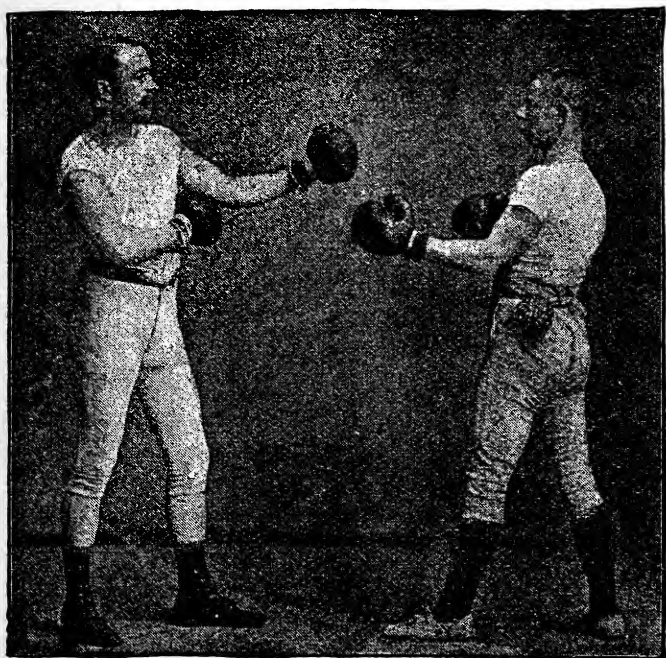
power of thought ; for it does happen that when the muscles are overworked, the brain power wanes. It may be seen that, if mental advantages are credited to some exercises, to others disadvantages are to be noted.

To train a man for the tug of war, the conditions are the same as for putting the hammer. The men must be mature. Anything like stinting them is impossible.

CHAPTER XXIII.

TRAINING FOR BOXING.

ABSOLUTE perfection of form is a necessity for those who would excel in boxing. Of all athletic exercises it



ON GUARD.

requires more care to make a man proficient in this special calling than in any other. It is the work which wants a man to be in his absolute maturity. He must

have not only great muscular strength, but agility and endurance. That peculiar excellence of the athlete known as "wind" is wanted, for it is called on to its utmost by the boxer. The brain stimulant in regard to which I have so frequently commented, must always give its force to the pugilist.

Two years of active gymnasium work are none too little for the man of 18 or 19 who wants at 20 or 21 to put on the gloves, and though he may work but little on the track, it is in running that he will best acquire that automatic lung power which is so necessary, for without having the fullest capacity to breathe, no man is worth anything. All those exercises which incline toward increasing the strength of the arms must be cared for. It is not sufficient to be a heavy hitter, but a man must be a quick one. It is the rapidity of the recovery, the alertness of a man's legs, the ability to escape a blow that is effective.

Perfection of condition best resists the effects of blows. You can hardly bruise a man, though you may fell him, if his muscular condition is excellent. In the very highly-developed condition of the prize-fighter, though doggedness goes for a great deal, real pain has less effect on the individual. How otherwise account for a man with a broken arm still standing up and fighting to the last?

In absolute training, unless a man be very gross, when he may lose some flesh, working a man down from his weight is to be deprecated. If a man is sound, I would

rather he had gained two pounds than to lose one. It is not fat nor pulpy flesh he has put on, but muscle. The utmost care as to diet must be observed, and the same rules are to be adopted as for boating men. Smoking is to be absolutely prohibited. Exercise should be evenly distributed, and never much of it before breakfast. It is before the midday meal that a fair amount of work is to be done. Walking, and a little running, are the great helps to making a sound wind. I never advise swimming, for the reason that the exact amount of strength it requires is not well ascertained.

A man in training for boxing must work with dumbbells and Indian clubs, but with not too heavy ones. I believe, too, in doing what is often neglected, and that is, vaulting and trying to fit the man for vaulting from right to left, and from left to right. I find too many men sadly deficient in the muscles of their waist, and neglectful of those exercises which would supply them. A certain rigidity of form is acquired from the position assumed in boxing. I have seen good boxers with a bad stoop.

The use of the bag has been the great improvement in the training of the boxer. A quarter of an hour with a heavy bag gives a man muscular power, with that rapidity which is so necessary. Learn not only to strike the ball with one, but with both hands, and what is more, try and dodge the ball, and as it swings over you, how to turn and strike it.

Including all the various exercises, with the mile walk, three hours a day of active work with the ball, and spar-

ring with a master, is amply sufficient. It is only a very choice man who would not suffer from a moment's longer work than this. The trouble of the trainer is in getting his pupil exactly "ripe." Work, then, should be allotted in just such a way that anything like staleness should be prevented. Attention to bathing and rubbing down is of the utmost importance in training for boxing.

I want in the first place a very strong man, and I want to keep him up to the highest notch of muscularity all the time. How much agility has to do with prowess in pugilism the professors can tell, for a lumbering giant has really but little chance on the platform. The man who is the glutton is rarely the champion. It need not be said that the art of pugilism is to give more than you take, but to do that skill is necessary, and to be awkward means to be wanting in nimbleness. In six weeks a man should be in good condition for boxing, providing always he has had some years of gymnasium before that. A good boxer must be a good all-around man.

For those with a decided taste toward boxing, I would advise such exercise as is found in the game of rackets. This fine sport it will be found teaches rapid improvement. I know of nothing which requires greater quickness of motion, with moderate display of force, than the game of rackets. A man has to be on the alert, and have precision of eye, in order to play well. I have found that rackets, for improving wind and for reducing unnecessary fat, had many advantages.

CHAPTER XXIV.

TRAINING FOR WRESTLING.

WHEN in romance literature I have read descriptions of wrestling matches, where "the lithe and sinuous man wound himself like a serpent around his burly adversary," I have always been satisfied that the gifted writer had never seen a wrestling match.

The conformation of a man to be a wrestler must incline him toward bulk. The greatest wrestler of modern times stood 6 feet 1 $\frac{1}{2}$ inches, and weighed 280 pounds. I do not mean that he should be a mountain of flesh, like a Japanese wrestler, but he must have that weight which tells, and united to that, great muscular power and endurance, for to be a good wrestler calls upon the man to use his utmost efforts.



AN UNDER HEAVE.

I am well aware that to be well up in the "chips" which make Cornish and Devon men such dangerous adversaries, skill is an important factor; but holding wrestling

only as an exercise, three-quarters of it is main strength. If boxing is a performance which calls for a thoroughly good all-around man, so does wrestling. Any flaw in the make or condition of the wrestler tells against him. I know of nothing where brute strength is so important. As often as not wrestling is a test of endurance. Two men locked together strive for mastery. Apparently they are motionless, but every muscle in their bodies is exerted to their utmost capability. Then comes for one or the other inclination toward physical weakening, and at once the better man gains the supremacy. I eliminate here the skill of the wrestler for the moment, but still I am satisfied that it is pure muscular force, with the capability of storing it up, which gives the wrestler his efficiency.

I know of no illustration which serves my purpose better than does wrestling, in order to show how an apparently motionless exercise produces the most marked effects on those who take part in it. The movements are but slight to the eye, but every muscle is doing its best. As a competent authority expresses it, "under the great pressure occasioned by their athletic effort, the larger vessels have been distended until they have momentarily lost power of recoil." Compression of the heart and lungs necessarily follows, and difficulties of respiration increase. There is more or less congestion. It is the panting, breathless condition of the men which makes this at once apparent. This congested state must arise, too, from the fact that muscular action is carried on with-

out movement, and just this brings on additional exhaustion. If wrestling were without any movement at all, the congestive tendency would soon incapacitate men, but quick as a flash comes the brief period of activity, the man is thrown into the air, or doubled over, and the period of high tension is past.

I may not hold wrestling as among the highest of athletic performances, and yet it calls upon the two most important factors, that of human endurance and of the supreme effort.

Only a grown man should wrestle. It is a sport unfitted for boys. Taking for build, the man who is fitted for a hammer thrower, continued work at the gymnasium is a necessity. There are muscles, especially those of the neck, which must be cultivated. If you look at a wrestler with a reputation, you will see how, by work, these peculiar muscles have been so exercised that they sometimes apparently deform the neck. As a fall may be claimed when the middle of the back touches the ground, wrestlers to prevent this so arch their bodies as to prevent their backs from touching the ground. This is accomplished by curving the neck in a fall, and supporting the body on the heels and the back of the head. In this position, unless an adversary has prodigious strength, a telling fall becomes impossible.

In matters of diet, the same regimen should be followed as in training for boxing. Anything like stinting food is dangerous. A wrestler after training ought not to have lost an ounce. I would rather he had increased

in bulk. Walking, with a little running, is necessary; for it is the wind, the automatic respiration, which tells so much in wrestling.

Wrestling, save as a secondary performance, has never been encouraged by our leading American athletic societies. The reason why this happens, arises in part from the fact that as carried out by professionals, wrestling has been degraded. The profession has introduced into wrestling certain cruel methods the public are little aware of. It is possible for a man to get such a hold on his adversary's arm or leg as to be able to break it. Having him in this position, the threat is made: "If you do not acknowledge a fall, I will break your arm or leg." We see no good reason why wrestling should be put on the records. Lately a leading English authority urges on amateurs the revival of wrestling, and this statement is made, "that the chief enemies of the art are often those who should be most in favor of it, the schoolmasters and the instructors in gymnasiums." The reason why such instructors oppose wrestling is the proper dread (not "the exaggerated dread") of broken bones. I may not have seen so many broken bones arising from wrestling bouts as I have lesions and ruptures.

If I want to get rid of stiffness and awkwardness, there are many better ways of doing that than by means of wrestling.

In examining the records, I certainly find more serious accidents arising to professionals from wrestling than from pugilism.

CHAPTER XXV.

TRAINING FOR LONG DISTANCE WORK.

IT will take all of six weeks for a man to prepare himself for any long distance work. Exercise should be steady all the time, long distances being left for the last two weeks of training. The best men all begin with the use of dumb-bells and clubs. As all gaits are permissible, a steady runner has great advantages. After bursts of speed, he is enabled to take up a fast walk and so relieve the strain on particular muscles.

Diet should be careful as to quality, and taken without stint. Frequent bathing and rubbing down help the condition of the athlete. The feet for long distance work are sources of trouble, and great attention should be paid to them.

In a physiological sense, it would look as if long distance going were the greatest strain that could be put on a man. This, however, when a man is perfectly sound, is not found to be the case. The reason why he is able to stand up against such excessive work, arises from the fact that he is not held down to one particular gait.

No exercise calls for greater precautions on the part of the trainer than for long distance work. Attention

to the man who is at work should be continuous. During the performance food should be varied as to kind, and the inclinations of the individual followed, but always within the rule of giving him such aliments as are most readily digestible. I am quite satisfied that during the last thirty-six hours of long distance covering, trainers do administer champagne. I think the quantity did not exceed a half tumbler, and that only repeated three times.

If men working at long distances could carry on their performances in the open air, there is no question but that additional miles would be added to their scores, and for this reason: forced to sleep in the buildings where their exercises take place, the air they breathe is in a measure vitiated, and the recuperative process hampered. After the work is over a long period of rest is a necessity, for reasons before explained.

CHAPTER XXVI.

EXERCISE FOR YOUNG MEN WHO HAVE NEVER BEEN AT A GYMNASIUM.

IF a young man has leisure the early walk is everything. Even providing a young man never has worked in a gymnasium, he ought to know how to walk, and to walk is not to slouch. He should take a brisk spell, beginning slowly, and putting in every now and then a spurt. It may not be possible, however, from bad weather, to take this early walk. As often as not there is no time, then exercises at home are in order. Take the dumb-bells and use them for fully fifteen minutes. The more movements you have at your command the better. All the lateral movements of the dumb-bells are excellent, especially those which call into play the muscles of the waist, for in ordinary life it is these and the abdominal muscles which are neglected.

Never tire yourself if you can help it. Exercise must depend somewhat on occupation. It is, however, the use of the legs which tends more than anything else to keep a young man in good form. If you can spare the time, walk to your place of business, even if you live four miles from your office. Try and do that much, weather permitting, at least once a day. Early in the

morning, when streets are unincumbered, it is wonderful how quickly four miles can be covered. Young men in business have more time for physical work of an evening. Before going to bed, ten minutes of dumb-bell work, carried out more leisurely than in the morning, will complete the day's work and insure sound sleep.

A man has not, however, exercised who has not walked his four miles in the twenty-four hours. There are many who, in the general round of their duties, accomplish more than this, but the methods used and the rests taken spoil the walking as an exercise.

I am very much in favor of dumb-bells, but not so much of weight-pulling for young men who only want to keep in ordinary training. A plentiful use of water naturally helps physical conditions.

EXERCISE FOR MEN PAST MIDDLE LIFE.

I should say walking is the panacea for half the ills men in the latter days of their lives suffer from. Methods of locomotion, such as are procurable in all large cities, economize time, and shorten life. A business man may not be able to spend an hour in walking in order to reach his office. Let him ride half way, then, and walk the other half. A half-hour walk in a day is very little, perhaps barely sufficient.

I have a case in point of a business man who believed he had no time to walk. He adopted, however, the half-time method as a kind of solemn duty. After two weeks' walking he found himself so much improved, that

in time he walked the whole distance from his home to his place of business. At once the benefits of exercise became evident. After a while, walking away, he cut down his record, and it was amusing to hear a man of fifty-five, in the crowded city streets, express his pleasure at having made his four miles inside of the hour.

If a man of fifty or past that, has a horse, riding is among the best of exercises. Generally in our climate it is the liver that goes wrong, and the movement of the horse stimulates the hepatic functions. For men of sedentary habits there is nothing, then, like a horse. Dumb-bells are good for men past the half century, but should be used with moderation. Men of a certain age lose much of their spring and elasticity, and so I have little inclination to have them use any mechanical adjuncts. If exercise is to be taken, it ought to be carried out in the morning on rising. For the man of fifty, five minutes of dumb-bell exercise is sufficient. When there is the least indication of heart trouble, anything like violent exercise should never be indulged in. I find in studying the best authorities on this subject, that the man of fifty is invariably supposed to be normal, whereas in too many cases he is not.

Advice as to using the striking-bag for men of fifty or past, I should oppose. I do not think that one city man in five hundred should attempt it. I should rather he played billiards. Something I strongly advise for men who, with age, take on stomach, is an exercise which is purely local. In some respects it is singular of

its kind. It is to work the muscles of the abdomen. By a peculiar movement, easily acquired, the muscles of the abdomen are rolled over themselves, and there being no muscular action possible, without disintegration, some of the fat of the abdomen is removed.

I have known decrease of abdominal fat become plainly evident by means of this muscular abdominal movement, with improvement of the digestive functions. The movement may be made up and down, and down and up. It is an exercise which old age requires, because it brings into play those muscles which in constant use in former days, with increasing years are neglected. I unhesitatingly recommend this movement for both men and women, and am positive that the benefits derivable from this exercise are very great. Begin by exercising these abdominal muscles for one minute, then stop for the day. The limit of such exercise should never exceed five minutes. People who are of spare habits, without tendency to corpulency, will find improved digestion by this exercise.

After all, it is walking which is the natural exercise for those who are past their prime. Men who in their younger lives have used the gymnasium, still have capabilities at fifty, and because they were trained to stand fatigue in their early days, they suffer no inconveniences.

It is walking which saves more men's lives than anything else. In certain portions of our country an extended walk is not always possible. It may be too hot or too cold. But still advantage should be taken of temperate weather.

Many business men who have means believe they find recreation and exercise in driving. Recreation they certainly get, but with a minimum of exercise. If horses are speedy, then skill on the part of the driver is a necessity. Attention to horses must be constant. The man is only exchanging his powers of thinking from his business to his horses. This is a mental advantage, but it is nothing more. In pulling at the reins, if the horses are not well broken, the character of the work is absolutely hurtful. Driving has none of the advantages of riding. Secretaries of State, in Washington, who are generally hard-worked men, find riding to be of the greatest advantage to them. An hour or two on horse-back is all they require, and in this special exercise they follow the wise example of English Cabinet officers. Care should be taken on the part of the writer of any book in which advice as to exercise is given to men of a certain age, because questions of food enter very much into particular conditions.

With the adult I have tried to show all the salient facts in regard to his diet. Old age is a return, in a certain way, to conditions of childhood. The child wants food at closer intervals than the adult. The child may be wearing himself out, but he is at the same time building himself up. The old man's waste may not be so rapid, but he does not build himself up. All he can hope for, then, is to remain *in statu quo*. He may require, according to his special organization, a certain amount of food which varies with the individual, but it

stands to reason that he cannot assimilate his nutrients as rapidly as when he was young. He should eat less at the one meal, or divide his food, as to its consumption, over a greater time.

It cannot be questioned but that a man of past fifty should eat less of certain things. If the question of diet with the athlete has been, we trust, carefully reasoned out, the old man, because he is old, cannot be an athlete, and can no longer assimilate the food which was necessary for him when he was a younger man. The object of this volume is to advise caution under all conditions of life. An old age is always possible, and one, too, comparatively free from bodily suffering when judicious exercise is carried out, but with it must be combined certain dietetic principles. The principles are better explained by the physician than by he who teaches methods of training.

I dislike the cockahoop methods of insuring longevity. All we can say is, that we certainly diminish our span of life by want of care. We can lengthen our days and make them free from pain by following out the natural laws of diet and exercise, but I place exercise in old age as a necessary but secondary factor ; and I am certain that the physiologist is of my way of thinking: that diet in old age is of the greater importance.

CHAPTER XXVII.

EXERCISE FOR WOMEN.

ALTHOUGH much has been written applicable to this particular subject, *i. e.*, the better development of the woman, I find but little that is really satisfactory. If physical education has not commenced early, when the woman was a child, certain confirmed habits have set in, and then when later on exercise is tried, it becomes a painful duty rather than a pleasure. Physical conditions vary with women, and whether they are married or not, make all the differences.

The utmost precautions are necessary when even girls of sixteen or past that age are given a course of gymnastic exercises. Were my opinion to be asked, I should insist that a woman alone should act as teacher for her own sex.

There are many radical vices of carriage in a woman which she herself could correct, which, if corrected, she would find added to her comfort. I think it is rather rarer for women to stand in the proper position than men. Generally, it is the inclination to throw the abdomen forward which tires them. The forward stoop is also common. The ordinary setting-up drill, as is in use for children, will be found of great advantage in correcting these faults.

It is in walking that women will find their best exercise. I never have cared to see anything like exhibitions of speed on the part of women, nor yet sluggishness in their walk. Women walk quite differently from men, and probably have to use more real exertion, due to a different form of construction. Their powers of endurance are apparently less, and therefore not so much in the way of pedestrianism is expected of them. Our climate, too, with its extremes of heat and cold, renders such walking exercise as English women take almost impossible.

We must all be grateful for such a capital exercise as is tennis, for it gives our women just that opportunity to use their arms and legs which croquet did not afford.

Any woman, whether a mother or not, can use the light dumb-bells to advantage. Exercises with them should not be long. Five minutes in the morning and the same at night suffice. I never advise the pulling of weights, believing them out of place for women. Many very extraordinary positions are indicated in the books as tending to give strength and elasticity to the female form. They are supposed to be special for women, though they differ in no respect from those in ordinary use for men. Their value may be questioned.

Riding for women is about the best of exercises. I am not so much in favor of rowing, unless precautions are taken as to the stretchers on which the woman rests her feet. The fault is to have them at too short a distance from the seat. It is much better that a woman

should row entirely with her arms, and depend for no additional force from the legs.

The question of endurance in a woman depends very much on her own stimulating powers. She can dance all night, because she likes to dance ; and cannot walk two miles without complaining of lassitude. In a fairly active game of tennis the exercise is by no means slight, and yet woman does not suffer. That unknown quantity, the endurance of the woman, ever escapes us. As Dr. Mitchell tells us, "women will take on fat, or lose it, and show no differences in vital force."

What are called calisthenics for women, I have no great faith in. It is good for little girls and those in the beginning of their "teens." With walking and riding, tennis and ten-pins, a woman's *répertoire* of exercises is filled. Bicycling may be indulged in when in a tandem machine, but in moderation. Swimming is good exercise, and better than skating. A billiard table in a house affords excellent opportunities for exercise for women, and is among the best of home games.

The difficulty about women who crave exercise, is their want of knowledge of just when to stop. The least excess does harm. The pleasurable excitement of a game of tennis, extended an hour or two more than it should be, takes away from the condition of the woman much more than it has given her.

The abdominal movements, which I have before described, will be found useful to women. It is impossible to carry this on when a woman wears corsets. They

must be taken off for this special exercise. Women, from the constant application of stays, have little flexibility of the waist, and just these muscles want relaxing through exercise.

To woman has not been given the muscular activity of the man, yet wonderful is her endurance. That her physical condition is capable of improvement need not be questioned. The methods to be employed must be gradual ones.

That the conditions of the woman are ever changing should always be borne in mind. What a woman may do to-day, she cannot do to-morrow.

CHAPTER XXVIII.

GYMNASTICS FOR CHILDREN.

A NORMAL child generally takes about as much exercise as is good for it, and the endurance of a healthy and active lad of eight, is often apparently beyond what might be expected of his years. Though he may be active, it is quite possible that he shows awkwardness in carriage. Such awkwardness often corrects itself naturally. I am not an advocate of having children put in gymnasiums at too early an age. I am inclined to believe that any other than the natural exercise a child takes is hurtful to him.

Certain lessons of carriage may be taught a child which, because they are not fatiguing, will be found of help. The simplest is a modification of that exercise called the setting-up drill, such as is used at West Point. For the setting-up drill, these changes from the regulation method are best adapted to children. Teach the child to stand straight. This attitude is best acquired by having it stretch out its arms straight above the head, sometimes bringing together the palms of the hands, sometimes the backs of them. This simple drill may be varied by having the fingers interlace. The movement of the arms upward should be gradual, ending by hav-

ing the palms or the backs of the hands brought directly to the front. When the arms are lowered, the hands should be brought invariably down, palms forward, and then applied to the sides of the thigh.

Heads may be raised by having the children look upward at their hands when they are held with outstretched arms above their heads. The feet should be slightly turned, and not kept parallel. I would advise not more than two minutes of this drill at the beginning, the arms to be lifted and lowered, say six times in the two minutes. The time may be increased to ten minutes, but not more than that, and with quicker movements.

The use of light dumb-bells made of wood, not to weigh more than one pound each, will help to amuse and, at the same time, straighten out a child. I never look for development of strength in such exercises, nor care so much for the suppling of the pupil. It is the early acquirement of control over the antagonistic muscles I most want. I have seen, by these simple methods, children who stooped badly made perfectly straight.

One thing always to be borne in mind is this, that the work done by children should never be for a long time, nor should any movements be made too rapidly. The use of light wands, which boys and girls take to quickly, gives opportunity for gentle exercise. I like wands about a yard long, and they should never weigh more than a pound.

The setting-up drill can be carried out, as to the up movements of the arm, with wands, and with them, too,

movements of precision are in order. Girls have not the muscles of the wrist as strongly developed as boys, while girls' fingers are very much more flexible. Wands seem to give both boys and girls just what they want.

At school, it is wise to break in on the monotony of study by twenty minutes of such exercises every day, the twenty minutes being divided into equal parts, one carried out in the morning, one in the afternoon. All slovenly movements must be at once corrected.

Always try and get children to sit straight in their chairs, if you can. Unfortunately, many must stoop who have defective eyes. Poorly printed school-books not only destroy eyes, but backs.

I do not want a lad under ten to put his foot in a gymnasium unless as a spectator. After that age it may be time to begin. I do not care that parallel bars should be attacked too early. I have found greater benefits derivable from the apparatus he takes to naturally, such as the swinging rings, and even the spring-board. Boys like the newer sensations of jumping, simply because their legs have always been in some kind of training. A lad acquires on the rings, or on the spring-board, a better consciousness of his physical limitations.

Gymnasium exercise, as to duration, depends very much on the lad. It is always better to have boys work too little than too much at the start. I try to get lads, when in the gymnasium for the first time, to work on the upright bars; this relaxes their muscles, but I will have no lifting nor pulley business. If the lad is light

weight, he has acquired already some cognizance of his arm-power on the rings. If heavy-bodied he has an acquaintance with the difficulties of overcoming such extra weight. It may be four months before I put him to the parallel bars. Then I have no objection if even he does try the grasshopper movements, for I have every reason to believe he is now fairly supple, has lost awkwardness, with some little gain of muscularity.

I want to know all the time the growth of the youngster. I take monthly measurements of his height, to the 32d of an inch, and this is possible by means of a nicely adjusted thin and pliable steel bar. I am somewhat indifferent to the increase of arm or leg developments, but I watch the chest closely. I am not satisfied, if, the lad being normal, he does not show some little growth after the first five months. I have seen cases, apparently of arrested growth, suddenly start after the first four months of easy gymnastic work, then seemingly come to a standstill, when harder exercises were commenced. Then natural growth would begin again.

I have tried to study the question of heredity in lads. Often it has happened that the boy at fourteen was nearly as tall as his father. Occasionally some extraordinary things have occurred under my notice, as lads, the offspring of a man and woman of low stature, suddenly starting to grow, and when these lads were young men of nineteen they would measure over six feet. They were the giants of the family.

If a lad enters a gymnasium at twelve, and works

carefully under judicious treatment, when he is fifteen he may be pushed, but never before that age, and then only in a few directions.

And this brings me to the important subject, and that is of allowing boys to sprint. I am positive that until a lad is past sixteen sprinting is the most dangerous of performances. I have not the least objection to a boy's running—you never ought to stop that—but I mean by sprinting is to have a lad, by means of training, attempt to cover a hundred yards within thirteen seconds. I do not care whether it is easy for him to do or not. You are taxing that lad beyond his powers. He may cover the ground in less than the twelve seconds, and even in a year or two cut that down, but the chances are that you have ruined that boy's health in the future.

When the lad has grown to be a man, all of a sudden he develops heart disease, and off he goes. I look at sprinting when lads are engaged in it, as nothing short of murder. I would rather see a lad run a mile than the short 100 or 150 yards. It is the quick, headlong burst of speed, as it must be taught, that wrecks immature systems. As I have said before, the Society for the Prevention of Cruelty to Children should peremptorily stop any exhibition of this kind, and parents should forbid their children from sprinting. Sprinting is as cruel and in just as bad taste as if a pugilistic contest were made up between children, only the consequences of sprinting are likely to be more serious.

I am sorry to believe that there are many executive committees of leading athletic clubs who have overlooked this matter by allowing undeveloped lads to enter for serious contests, not only in foot races, but in bicycle matches. It may sound highly creditable, and bring applause to a club, to have "a very young one" run first in a leading event, but if next year or the year after, that committee had to attend that young member's funeral, some of the club might accuse themselves at least of want of care. I do not think bicycle racing for young lads brings the same dangers, because the tax on the vital system is not so great. The danger of it all lies in too rapid work. A man has more self-control than a lad, and knows when to stop, whereas a lad does not.

One simple exercise for children consists in their standing erect, with the position of the body above the waist kept fairly rigid. Place the hands with the arms bent, and the palms touching above in the position to be assumed in diving, then lower the arms until they are on a line with the shoulders. In bringing the hands down, let the palms be upward. Begin slowly with children, and let them in time work up the movement more rapidly. I have found this expanding the chest and modified a tendency to round shoulders. It broadens the chest and takes away inclinations to stoop. Five minutes of this work is enough at any one time.

CHAPTER XXIX.

BLISTERS OF THE FEET.

THE sprinter, runner, hurdler, walker, even cyclist will have blistered feet occasionally. If he is used to the work, this may arise from an ill-fitting shoe or a seam in the sock. Sometimes how a blister comes is a mystery. If the blister be small, relief is often had by taking a bit of gummed paper and applying it to the blister. If the blister is large, use a needle, never a pin. Do not open it in the centre where it is highest, but at its lowest side, for then the dead skin will act as a protection until the new cuticle is formed. I have found benefit from the use of vaseline for tender feet. It is much better than soap for the foot.

This general advice may be given to those who undertake any pedestrian exercise where speed is not the object. Shoes must be broad and heels low. A shoe with a heel more than an inch in height is not fitted for walking. The sole of the shoe ought to be four inches in width. I do not believe in a tight fit for the toes. There should be room enough for the big toe to rise. I have found great benefit, in long walking trips (having but one pair of shoes), by the introduction of small bunches of horse-hair just at the toes. If any

one has ever walked down a mountain side, or a long slope for some hours, he will notice that the big toe, pushing too far forward, is oftentimes bruised. Very slight changes in the fit of the shoe, by use of a little wad of horse-hair, prevents blistering.

BOILS AND CARBUNCLES.

The boil is bad enough for the man of ordinary occupations, but for he who is in training, it is the most terrible of visitations. A bone felon is worse, but that is hardly a consolation. A man may have to grit his teeth and keep somehow along with a boil, but with a bone felon, all work necessarily stops. Some romance writers have made a man pull and win in a race with a bone felon, but that is amateur athletic novel writing.

I have said, what I believe to be the case, that beer drinking induces boils. The most abstemious of men are, however, likely to have them. The system is doing what it can to eliminate what is foreign to a healthy body, and it starts some bad germ, forces it to the front, and there is trouble. A man who is in training or his trainer should watch out for any little localized form of irritation. Pure carbolic acid, applied to the cuticle, often checks growth of boils, as does iodine. Poultices of bread, of linseed meal, and even the old method of using soft soap and sugar, tend to soften the dense skin, and allow the boil to come more readily to the surface, and so find its discharge. If the knife has to be used, and in many cases it is the best thing to do, if the cut

surface be treated at once, with boracic or zinc ointment, a speedy cure comes.

Anything that chafes, as a shirt collar, may bring a boil on the back of the neck. Men who row are prone to boils, caused by the friction of their buttocks on the seat of the boat. Such boils are very painful. Sometimes they entirely incapacitate a man for work. The sooner you get rid of them by surgical method the better. Boracic ointment or an ointment made of simple cerate and oxide of zinc, spread on a piece of kid glove, brings about rapid healing for these boils. For bruises I think applications of flannel, steeped in boiling water, bring about the quickest relief. When a man bruises too readily, or retains the mark of a bruise over long, his condition is not good.

RUPTURE.

There is but one advice : go instantly to the doctor.

SPRAINS.

Good men are subject to sprains. Generally the greater number of them happen to the ankle. With men in prime condition, such accidents are rarely, if ever, serious. The muscle has become used to violent tension, but you have tried to stretch it more than it could stand. Dr. J. F. Little's treatment is the best I know of. Instantly after the trouble is determined, stroke the injured part firmly toward the body. You must handle as tenderly as possible all the adjacent

parts. Use an animal oil only, because it facilitates the rubbing. Try to flex the limb by massage. The remarkable part of this heroic treatment lies in the idea, that the limb must be used, so that stiffness shall not follow. The trouble about this method is that it is rather painful at first. I have, however, seen this method employed with wonderful results. If the sprain has not been treated instantly, if there has been delay, send for a doctor. The quick recovery of men in training from sprains is astonishing. To relieve pain from strains, cold water is excellent.

ULCERATION.

Sometimes, in long distance performances, chafing and, finally, ulceration occur. I might modify the "sometimes" very considerably, by stating that it is rare when in a long distance performance men do not chafe, and so badly that it is a wonder how they can get along at all. Lint, soaked in carbolic oil, one part oil and twenty of lint, is excellent. Apply it by means of a bit of oiled silk, and bandage carefully. The tighter part of the pressure ought to come from below. Change the dressing at least twice a day. Use lukewarm water for cleansing. When the surface is limited, applications of zinc ointment or boracic ointment answer all purposes.

BLEEDING AT THE NOSE.

This kind of bleeding will occur at times, and if too constant, the man had better stop work for a short

time. It is, however, rarely serious. Some very small vessel, generally of the nose, has been ruptured. There is a method to stop bleeding at the nose, which is often effective: It is to stretch out the arms above the head, but not to make them too rigid. The reason for it may or may not be correct. I give it for what it is worth, and it is, that the blood being called on to do more work, presents itself at the broken vessel with less force, and so hemorrhage ceases.

SUNSTROKE.

It has been clearly shown that sunstroke is rather an effect of overwork than due to sun action. As sudden exhaustion takes place, generally in the daylight when the sun shines, the action of the sun is supposed, in a certain measure, to produce this comatose condition. It is rare in the tropics—more common in the temperate regions.

Sunstroke ought never to occur on the track. It is the part of the trainer to prevent any heavy work when the sun is directly over the heads of pupils. Conditions of the men, especially those at work on a hot or oppressive day, should be looked at. Weed out the weaker men. It is often wise to peremptorily decline work for all hands. I have mortal dread of sunstroke, because I firmly believe that if a man has sunstroke, he never is as good a man after it,—that is, for athletic exercises. It has premonitory symptoms, such as overdryness of the skin, difficulty of perspiration, and it is not unusual to lose distinctness of sight.

"Things looked rather blurry to me," I heard a young man say, as he came home panting after a sharp two hundred and fifty yards run on a scorching September day. Next day I saw him again on the track. I had no business to interfere. There was his trainer. The day was hot, but lower by several degrees than the day before, but too hot for the work the young man was trying to accomplish. I had a premonition of disaster, and left the grounds. The next day I read that the young man had fallen down with a sunstroke. Subsequently he recovered, but his doctor said that his patient's athletics were to be postponed to a far distant future.

If a man feels like "going down," take towels, steep them in cold water and apply them to the back of the head and the back of the neck. If the stroke comes, strip him, carry him in the shade, lay him down with head a little up, and with a basin, bucket, or dipper, douche him with cold water on the head and chest. Send for a doctor post-haste. You have done all you can.

DROWNING.

A boating man never drowns, so it is believed, but awkward men do get out of their boats into the water, and occasionally give a great deal of anxiety in the efforts made to resuscitate them.

Methods of treatment to bring back to life those who have approached the condition of being drowned, cannot be too often printed, because there is the crassest ignorance displayed in regard to the proper treatment.

A man who is drowned is dead ; but a man can come near drowning and yet not be dead. What is his condition? His flame of life only flickers. Now, suppose you had a lantern, with a wick in it, which was barely lit. In order to increase the flame, would you swing the lantern about? There is no question but that, if you did that, by your rough motions the lamp would go out. Careless and brutal movements are never to be employed when resuscitation is attempted.

Anybody who, at the close of the nineteenth century, rolls on a barrel a man taken inanimate from the water, is nothing short of a criminal.

The best method I can find for resuscitation is that printed in the "Hints to Travellers," published by the English Geographical Society. "Efforts to restore the breathing must precede all other means. Remove clothing down to the waist, laying the patient on the ground, face downward, bending one of his arms under his forehead ; wipe his mouth. If breathing does not then return, turn the patient on his side ; stimulate the nostrils and rub the chest vigorously. The patient must now be replaced briskly on his face, turned back to his side and a little beyond, and then briskly back on his face again, and repeat this about every four seconds ; each time that the patient is on his face, press sharply on the back between the shoulder-blades. If unsuccessful within five minutes, place patient back with his clothes under his shoulders, draw forward the tongue, and attach it with an elastic band or cord under the chin. Then

standing behind his head, grasp the arms below the elbows, and draw them steadily upward above the head to expand the chest, and keep them stretched upward for two seconds, then turn down the arms and press them firmly for ten seconds against the sides of the chest to expel air. Repeat this fifteen times per minute."

This treatment is excellent. What you are trying to do is to work mechanically on the patient, and induce inflation of the lungs. If he breathes, that starts the human machinery.

LINIMENTS.

Save in a special way, I have not the least faith in liniments or embrocations. I am pretty certain that trainers who understand their business never use it, save for a distinctly local trouble, as of a strained tendon. All such stuff as is printed about the sovereign power of this or that liniment, is pure quackery. A man in good form never wants any other external applications than those which water and soap give. Dr. W. L. Savage says in regard to a strain and the use of liniment:

"It is the friction in rubbing that helps the athlete, the liniment playing a small part, although it serves as a lubricant and enables the trainer to get hold. But I do not believe there is any good derived from the bare application of a liniment. The principal compound of the various lotions is alcohol, but this having an irritat-

ing effect may prove a sort of stimulant, but is merely superficial."

Some men of experience have advocated the general use of camphorated oil, but its advantages are questionable. I should rather think camphor would do harm. I prefer pure vegetable or animal oils, simply because they act as lubricants for the hand of the masseur, for, after all, the rubbing down of a man is vigorous massage.

I would advise that the purchase of any compound advertised for athletes, with testimonials showing how by its use a man won a race, be severely let alone. Some years ago, I had a man placed under my charge whose skin was badly blotched, the cuticle inflamed, from having used a liniment. There really was neither poisonous nor irritating substance in the lotion, only the skin of the man was over-sensitive. The substances useful to a man training when accidents occur, I present. The medicaments are all officinal, and such as a doctor would prescribe.

INDURATING MIXTURES.

The idea that there is anything which will harden the hands, with the exception of work, is nonsense. All washes and nostrums are useless. You can color your hands blue if you want to, but the blue is only skin deep. The true bronze of the hand, with its perfection of epidermis, which never bruises, is only obtainable by exercise.

CHAPTER XXX.

THE TRACK—HOW TO MAKE IT.

DISCUSSIONS are endless as to the exact form of the track, whether it should be circular, parabolic, or elliptical. The ideal track would be the straight line. A curve is an impediment to speed. When the track is straight, the ground is made level. Where there are curves, the slope begins from the outer to the inner edge, and depends for incline on the width of the track. The true line is run about eighteen inches from the inner edge. Ten inches of digging up the original ground is none too much for the making of a track. The width ought to be thirty-five feet. You cannot have two tracks, one for runners, another for bicycles; but it would be better, if this were possible, because a broad track for machines prevents upsets.

The first thing is to line both sides of the edge of the track with timber of fully two inches in width, and this timber should be coated with tar. Then coal-ashes, with plenty of clinkers, are put on the broad track and carefully rammed. To turn a good head of water on the first layer and to apply fresh cinders where it sinks, insures lasting qualities. After four inches of ashes are laid, then comes two inches of loam. Loam containing

too much clay is not fitted for the purpose ; it packs too solidly. This loam should be screened and every pebble rejected. It must be rolled flat. It is part of the foundation of the track.

You cannot hurry it, and it ought to take a month to settle. Finally, the top layer of cinder is put in place. I should say that an inch of top cinder is all that is necessary. It need not be packed. Rolling would hurt it. This top dressing receives careful raking and smoothing and natural settling. A track wants constant attention. The effect of wind in a certain quarter or of rain may make differences. The cinders may accumulate in certain places or be too thin in others.

In such establishments as maintain a first-class track, a superintendent and two helpers find plenty of work. The trouble is to keep the track flat in its long stretches. It will not do to take advantage of the natural methods of road building, such as of making the track rise in the middle, so as to drain itself. Patent arrangements of covered drains have been used, but I do not think with advantage.

No fencing is admissible. How to do so simple a thing as to mark distances on the track has been much discussed. Fixed posts are dangerous, not to the runners, but to the spectators. Bits of stone planted in the ground trip up sightseers, and are not to be thought of. Whitewash markings on the track are sometimes used, but are prone to cause disputes. Pieces of wood, not more than four inches square and four feet long,

driven into the ground until flush with the track, with the distances branded on the top, will be found useful. They should not be, however, on the track, but six inches from the outer edge.

Spent tan bark is not in favor. It makes a dull, heavy track. It is not stable. In wet weather it holds the moisture too long, and a sharp trial of speed may take place just after a rain. Tan bark has its use in the making of an impromptu track where lasting qualities are not required. The best runners think that a tan bark hurts the feet more than the firmer, but more elastic, cinder track. It is undoubtedly a slow track.

CHAPTER XXXI.

AXIOMS FOR AMATEUR ATHLETES.

DEFECTIVE dissimilation of fat produces obesity. Insufficient combustion of nitrogenous materials induces gout.

Exercise is a regulator. It eliminates what are overgrowths in our bodies, and increases the stock of what is wanted.

There must be reserve material in the human body. How could you run a mile, sending out the manufactured products by one door, if the raw material did not come in at the other?

Try and understand the relationship of fat to the whole system. When you swallow fatty matter, it is not converted into fatty substances. Some fat may be absorbed, but the starches make the fats, being first converted into sugar. You never could destroy all the fat in you. If you did that you would be likely to die. When a man is emaciated, he may be said to have no fat in him.

A man over-reduced is a man spoiled. You have burned all the oil, and nothing is left but the wick. A wick alone will give little light. If you do get it to flame, it at once burns itself out.

Muscle is started from the brain, and there is reflex action. Therefore judicious exercise results in brain improvement and body improvement. You can overtax muscle and impair brain.

Stagnancy of brain from want of work is as common as muscular feebleness from want of exercise. Interstimulation is constant. The brain works the muscles; the muscles work the brain. How, otherwise, could it happen that savages can work themselves into a frenzy by dancing?

Men who are nervously excitable are those who must be most careful as to the exercises they take. In such cases, with tire of muscle, may come over-excitation of brain.

Fatigue for those who exercise is a matter of temperament. It may arise because the work to be done has not been made automatic.

No muscle works when it is cold. The stimulation or warming of muscle may come from the brain without any perceptible movement of the body.

Fatigue manifests itself early, like hunger. A man does not die because he is either fatigued or hungry. Fatigue is a premonitory symptom, as is thirst. It must claim attention in time. Fatigue, then, is a kind of regulator "warning us that we are exceeding the limits of useful exercise, and that work will soon become dangerous."

Americans are more prone than any other race to nervous exhaustion. Methods of life, the drive of business,

and great climatic changes bring this about. "Manufacturers and certain classes of railway officials are the most likely to suffer nerval exhaustion. Next to these come merchants in general, brokers, etc., then as frequently clergymen; still less often lawyers, and more rarely doctors; while distressing cases are apt to occur among the over-schooled ones of both sexes."

There is every reason to believe that a man can be stroke-oar of his boat and win the first academic honors in his class. It is good to be ambidexter.

"Puddlers and boiler-makers, plumbers and carpenters, coopers and smiths, shipwrights, carriage-makers, tinnerns, and all who follow trades calling for vigorous muscular action, not only constantly work on one side more than on the other, but many of their tools are purposely right-handed, so that they could hardly use them with their left hands if they wanted to. Take the mechanic where you will, in the vast majority of instances, his right arm and side are larger and stronger than his left, and quite as often his vocation does little or nothing to develop and strengthen his legs."—BLAIKIE.

"When a man who does not know how to run stops short, it is simply a man whose system is under the influence of transient intoxication with carbonic acid, resulting from exercise. A horse urged into a very rapid gallop, and forced to run until he drops, dies overworked. The accident which kills it is due to the carbonic-acid gas with which its system is saturated. The

man ceases running. No harm comes, because he is his own master. In the case of the horse, the animal is not his own master."—LAGRANGE.

"I would urgently recommend the man in training to rise early. To him who would build up his body in health and strength, this would be the corner-stone of his edifice. There is in the morning air an invigorating freshness which is sought in vain at any other period of the day."—MACLAREN.

"Most of the training lore that has come down to us is of the professional stamp, the outcome of much hard and sharp experience, largely diluted with ignorance and absurdity."—HILLIER.

"To perform exercise of strength with impunity, the food must be sufficiently abundant to supply losses. If the food is not sufficiently restorative, the work is done at the expense of the materials of the body; the worker succumbs then, and is quickly exhausted."

"That horse has eleven chances in the ten to win."

"How eleven in ten? That is not possible in an arithmetical sense."

"Yes, it is. The beast and his fine blood stand for five, the best oats and hay for two, and then there are four more points for his training."—*Race Talk*.

Over-forcing is rapid wearing out.

"Unless a rowing man does other work especially intended to correct defects, he has invariably poor arms above the elbow, a marked inferiority in the development of the chest compared with the back, and he gen-

erally has round shoulders and a forward hang of the head and neck.”—PROCTOR.

Say there are as many members of an athletic club as there are letters of the alphabet. Mr. A and Mr. B make records. But what of all the rest of the members? A and B may be proud of their honors, and have a right to feel so. The rest will have to be satisfied with the distinction accorded to A and B. But it would have been better if there had been four good men instead of two, or eight instead of four. What I mean to express is this: An athletic club, wishing to do the most good to its members, must look rather to general than to special excellence. Try and make yourselves good all-around men, rather than manufacture isolated stars.

“The climatic peculiarities which have changed our voices, sharpened our features, and made small the American hand and foot, have also made us in middle and advanced life, a thinner and more sallow race, and possibly adapted us better to the region in which we live.”
—DR. S. W. MITCHELL.

“The exact relations of fatty tissue to the condition of health are not yet well understood, but since in great exertion or prolonged mental or nerval strain, or in low fevers, we lose fat rapidly, it may be taken for granted that each individual should possess a certain surplus of this readily lost material.” Even thin people have it in some quantity, and despite fluctuations, every one has a standard share, which varies at different times of life.

To walk a great deal in a man's or a woman's middle

or later years, is to extend the duration of life. If in the large cities means of locomotion, such as cars, were non-existent, men and women would live longer.

It has sometimes been said that in training, an animal has advantages over a man, because the animal is forcibly more obedient to the trainer's will. A horse may be made to exercise only so much. His feed may be given him in exact quantities, and of specified quality. But the advantage should all be in favor of the man, due to his superior intelligence, for he alone appreciates (or ought to appreciate) the laws which govern physical development.

“Of all animals, man is the most susceptible of improvement by means of training, and next to him ranks the race-horse. The severity of training is rendered comparatively light by a cheerful companion ; one who, while enforcing completion of work, encourages and diverts the worker. In short, a very important portion of the duties of the trainer, is that of always keeping the mind as well as the body of his charge profitably employed.”—HANEY.

Draw a sharp line of distinction between exercising and training. A child runs, exercises, but does not train. Exercise is one of the preparations of training, but alone, without other conditions, it remains only exercise.

CHAPTER XXXII.

DEFINITION OF AN AMATEUR ATHLETE.

NATIONAL ASSOCIATION OF AMATEUR ATHLETES OF AMERICA.

AN amateur is any person who has never competed in an open competition, or for money, or under a false name ; or with a professional for a prize, or where gate money is charged ; nor has ever at any time, taught, pursued, or assisted at athletic exercises for money, or for any valuable consideration. But nothing in this definition shall be construed to prohibit the competition between amateurs for medals, cups, or other prizes than money.

And it is hereby expressly declared that this definition is not retroactive, and that all past acts of amateurs shall be judged in accordance with the provisions of the old definition ; and that the foregoing definition shall take effect on and after the first day of May, 1885.

To prevent any misunderstanding in reading the above, the Association draws attention to the following explanations and adjudications :

An athlete has forfeited his right to compete as an amateur, and has thereby become a professional, by—

(a) Ever having competed in an open competition (*i. e.*, a competition, the entries to which are open to all,

irrespective as to whether the competitors are amateurs or professionals, and whether such competition be for a prize or not) in any athletic exercise over which this Association has declared its jurisdiction.

(b) Ever having competed for money in any such athletic exercise.

(c) Ever having competed under a false name in any such athletic exercise.

(d) Ever having knowingly competed with a professional for a prize, or where gate money is charged in any such athletic exercise.

(e) Ever having taught or pursued as a means of livelihood any such athletic exercise.

(f) Ever having directly or indirectly accepted or received remuneration for engaging in any such athletic exercise.

An athlete shall hereafter forfeit his right to compete as an amateur, and shall thereby become a professional, if, at any time after the foregoing definition shall take effect, he shall—

(1) Directly or indirectly receive payment for training or coaching any other person in any athletic exercise over which this Association shall declare its jurisdiction.

(2) Directly or indirectly receive payment for services personally rendered in teaching any such athletic exercise.

(3) Directly or indirectly receive payment for services rendered as Referee, Judge, Umpire, Scorer, Manager, Director, or in any other capacity, at any professional ex-

hibition or contest of any athletic exercises whatsoever.

NOTE.—Nothing herein shall be construed to prohibit the acceptance by any amateur of his necessary traveling expenses incurred by any Referee, Judge, Umpire, Scorer, or Starter, in going to and from the place of any amateur contest.

(4) Directly or indirectly run, manage, or direct for prospective profit any professional exhibition or contest.

An amateur shall not hereafter forfeit his right to compete as an amateur, and shall not become a professional, by—

(a) Receiving compensation for services rendered as ticket-taker or ticket-seller at any contest or exhibition of amateur athletics.

(b) Receiving compensation for services personally rendered as Secretary, Treasurer, Manager, or Superintendent of any amateur athletic club.

(c) Receiving compensation as editor, correspondent, or reporter of, or contributor to any sporting, athletic, or other paper or periodical.

(d) Running, managing, or directing, for prospective profit, any sporting, athletic, or other paper or periodical.

(e) Receiving compensation for services personally rendered as official handicapper under the direction and authority of the National Association of Amateur Athletes of America.

(f) Receiving from a club of which he shall be a mem-

ber the amount of his expenses necessarily incurred in travelling to and from the place of any amateur contest.

AMATEUR ATHLETIC UNION OF THE UNITED STATES.

“One who has not entered in an open competition ; or for either a stake, public or admission money or entrance fee ; or under a fictitious name ; or has not competed with or against a professional for any prize or where admission fee is charged ; or who has not instructed, pursued, or assisted in the pursuit of athletic exercises as a means of livelihood, or for gain or any emolument ; or whose membership of any Athletic Club of any kind was not brought about or does not continue, because of any mutual understanding, expressed or implied, whereby his becoming or continuing a member of such club would be of any pecuniary benefit to him whatever, direct or otherwise, and who shall in other and all respects conform to the Rules and Regulations of this Organization.”

CHAPTER XXXIII.

RECORDS.

THE following are the best Amateur Records made in America and England, at championship events:

75-YARDS RUN.

America, $7\frac{3}{4}$ seconds.—F. G. Saportas, New York City, Jan. 5, 1878; A. Ing, New York City, Sept. 14 and Nov. 28, 1878; M. McFaul, New York City, Jan. 5, 1879; H. H. Lee, New York City, April 5, 1879; L. E. Myers, New York City, Jan. 31, 1881; J. B. White, New York City, March 16, 1883.

100-YARDS RUN.

* America, $9\frac{1}{8}$ seconds.—John Owen, Jr., Washington, Oct. 11, 1890.
England, 10 seconds.—A. Wharton, London, July 3, 1886.

150-YARDS RUN.

America, $14\frac{4}{5}$ seconds.—C. H. Sherrill, Jr., N. Y. City, May 17, 1890.
England, $14\frac{4}{5}$ seconds.—C. G. Wood, London, July 21, 1887.

220-YARDS RUN.

America, 22 seconds.—W. Baker, Boston, June 14, 1886.
England, $21\frac{1}{2}$ seconds.—C. G. Wood, London, June 25 and July 22, 1887.

300-YARDS RUN.

America, $31\frac{3}{8}$ seconds.—L. E. Myers New York City, Oct. 22, 1881.
England, $31\frac{1}{4}$ seconds.—C. G. Wood London, July 21, 1887.

* Not yet allowed by the Amateur Athletic Union.

440-YARDS RUN.

* America, $47\frac{2}{5}$ seconds.—W. C. Downs, Boston, July 9, 1890.
 England, $48\frac{1}{2}$ seconds.—H. C. L. Tindall, London, June 29, 1889.

600-YARDS RUN.

America, $1:11\frac{2}{5}$.—L. E. Myers, New York City, July 1, 1882; W. C. Downes, New York City, May 17, 1890.
 England, $1:12$.—H. C. L. Tindall, Cambridge, March 16, 1889.

880-YARDS RUN.

America, $1:55\frac{1}{4}$.—W. C. Dohm, Travers Island, N. Y., June 29, 1889.
 England, $1:54$.—F. J. K. Cross, Oxford, March 9, 1888.

1000-YARDS RUN.

America, $2:13$.—L. E. Myers, New York City, Oct. 8, 1881.
 England, $2:14\frac{1}{5}$.—L. E. Myers, Birmingham, July 19, 1884.

1-MILE RUN.

America, $4:21\frac{2}{5}$.—W. G. George, New York City, Nov. 11, 1882.
 England, $4:18\frac{2}{5}$.—W. G. George, Birmingham, June 21, 1884.

2-MILES RUN.

America, $9:32\frac{1}{5}$.—W. D. Day, New York City, May 17, 1890.
 England, $9:17\frac{2}{5}$.—W. G. George, London, April 26, 1884.

3-MILES RUN.

America, $14:39$.—W. D. Day, Bergen Point, N. J., May 30, 1890.
 England, $14:29\frac{3}{5}$.—J. Kibblewhite, London, Aug. 31, 1889.

4-MILES RUN.

America, $20:15\frac{4}{5}$.—W. D. Day, Bergen Point, N. J., Nov. 16, 1889.
 England, $19:39\frac{4}{5}$.—W. G. George, London, May 17, 1884.

* Not yet allowed by the Amateur Athletic Union.

5-MILES RUN.

America, 25:23 $\frac{3}{5}$.—E. C. Carter, New York City, Sept. 17, 1887.
England, 25:07 $\frac{4}{5}$.—W. G. George, London, July 28, 1884.

6-MILES RUN.

America, 31:29 $\frac{4}{5}$.—E. C. Carter, New York City, Nov. 6, 1886.
England, 30:27 $\frac{1}{2}$.—W. G. George, London, July 28, 1884.

7-MILES RUN.

America, 36:54.—E. C. Carter, New York City, Nov. 6, 1886.
England, 35:37.—W. G. George, London, July 28, 1884.

8-MILES RUN.

America, 42:19.—E. C. Carter, New York City, Nov. 6, 1886.
England, 40:57 $\frac{2}{5}$.—W. G. George, London, July 28, 1884.

9-MILES RUN.

America, 47:41 $\frac{4}{5}$.—Sidney Thomas, West New Brighton, S. I., Oct. 26, 1889.
England, 46:12.—W. G. George, London, April 7, 1884.

10-MILES RUN.

America, 52:38 $\frac{2}{5}$.—W. D. Day, West New Brighton, S. I., October 26, 1889.
England, 51:21.—W. G. George, London, April 7, 1884.

1-MILE WALK.

America, 6:29 $\frac{3}{5}$.—F. P. Murray, New York City, Oct. 27, 1883.
England, 6:32 $\frac{1}{5}$.—H. Whyatt, Birmingham, May 3, 1884.

3-MILES WALK.

America, 21:09 $\frac{1}{5}$.—F. P. Murray, New York City, Nov. 6, 1883.
England, 21:25 $\frac{1}{5}$.—C. W. V. Clarke, London, June 29, 1887.

4-MILES WALK.

America, 29:40 $\frac{4}{5}$.—T. H. Armstrong, New York City, Nov. 6, 1877.
 England, 29:10.—W. H. Meek, London, July 12, 1884.

2-MILES BICYCLE.

America, 5:21 $\frac{3}{5}$.—W. A. Rowe, Springfield, Oct. 23, 1885.
 England, 5:12 $\frac{1}{5}$.—W. A. Illston, Coventry, May 21, 1889.

120-YARDS HURDLE.

3 feet 6 inches.

America, 16 seconds.—H. L. Williams, Morris Dock, N. Y., May 17, 1890; F. T. Ducharme, Washington, Oct. 11, 1890.
 England, 16 seconds.—C. N. Jackson, Oxford, Nov. 14, 1865; W. R. Pollock, London, April 18, 1884; C. F. Daft, London, July 3, 1886; S. Joyce, Crewe, June 30, 1888.

200-YARDS HURDLE.

3 feet 6 inches.

America, 26 $\frac{3}{8}$ seconds.—F. C. Puffer, Boston, April 14, 1890.

220-YARDS HURDLE.

2 feet 6 inches.

America, 25 $\frac{1}{4}$ seconds.—J. P. Lee, Morris Dock, N. Y., May 17, 1890.

300-YARDS HURDLE.

America, 37 $\frac{3}{8}$ seconds.—A. F. Copland, New York City, June 18, 1887.

RUNNING HIGH JUMP.

America, 6 feet 4 inches.—W. B. Page, Philadelphia, Pa., October 7, 1887.
 England, 6 feet 3 $\frac{1}{4}$ inches.—W. B. Page, Stourbridge, Aug. 15, 1887.
 Indoors, America, 6 feet.—W. B. Page, Philadelphia, Pa., Jan. 23, 1888, and Baltimore, Md., Dec. 16, 1887.

RUNNING BROAD JUMP.

- * America, 23 feet $3\frac{1}{8}$ inches (measured from Scratch Line).—A. F. Copland, Washington, Oct. 11, 1890.
 England, 23 feet $3\frac{1}{2}$ inches (measured from toe to heel).—E. J. Davies, London, March 27, 1873.

RUNNING HOP, STEP, AND JUMP.

- America, 44 feet $10\frac{3}{4}$ inches.—J. B. Connolly, Boston, Sept. 25, 1890.
 Great Britain, 48 feet 3 inches.—John Purcell, Limerick, Ireland, June 9, 1887.

STANDING HIGH JUMP.

- America, 5 feet $1\frac{1}{4}$ inches.—W. Soren, Mott Haven, May 29, 1880.
 Great Britain, 4 feet 10 inches.—F. Hargreaves and E. Moore, Pendlebury, Eng., Aug. 5, 1871.

STANDING BROAD JUMP.

- America, 10 feet $9\frac{3}{4}$ inches.—M. W. Ford, New York City, April 23, 1885.
 England, 10 feet 5 inches.—J. J. Tickle, Manchester, Sept. 2, 1871.

POLE VAULT FOR HEIGHT.

- America, 11 feet 5 inches.—H. H. Baxter, N. Y. City, Oct. 15, 1887.
 England, 11 feet 7 inches.—E. L. Stones, Southport, June 2, 1888.

POLE VAULT FOR DISTANCE.

- America, 26 feet $4\frac{1}{2}$ inches.—A. H. Green, Boston, April 14, 1890.

THROWING 56-POUND WEIGHT FOR HEIGHT.

- America, 15 feet 2 inches.—J. S. Mitchell, Boston, April 14, 1890.
 Great Britain, 13 feet $\frac{1}{2}$ inch.—J. S. Mitchell, Ballylanders, Ireland, Oct. 8, 1887.

THROWING 56-POUND WEIGHT FOR DISTANCE.

- America, 32 feet 10 inches.—C. A. J. Queckberner, Washington, Oct. 11, 1890.

* Not yet allowed by the Amateur Athletic Union.

PUTTING 16-POUND SHOT.

* America, 46 feet 2 inches.—G. R. Gray, New York City, Sept. 20, 1890.

Great Britain, 44 feet 10½ inches.—J. O'Brien, Dublin, Ireland, July 11, 1885.

PUTTING 24-POUND SHOT.

America, 33 feet 11¾ inches.—G. R. Gray, Boston, April 14, 1890.

THROWING 16-POUND HAMMER.

America, 133 feet 8 inches.—J. S. Mitchell, Elkton, Md., Oct. 10, 1889.

Great Britain, 126 feet 4 inches.—P. Lawless, Cork, Ire., Sept. 5, 1889.

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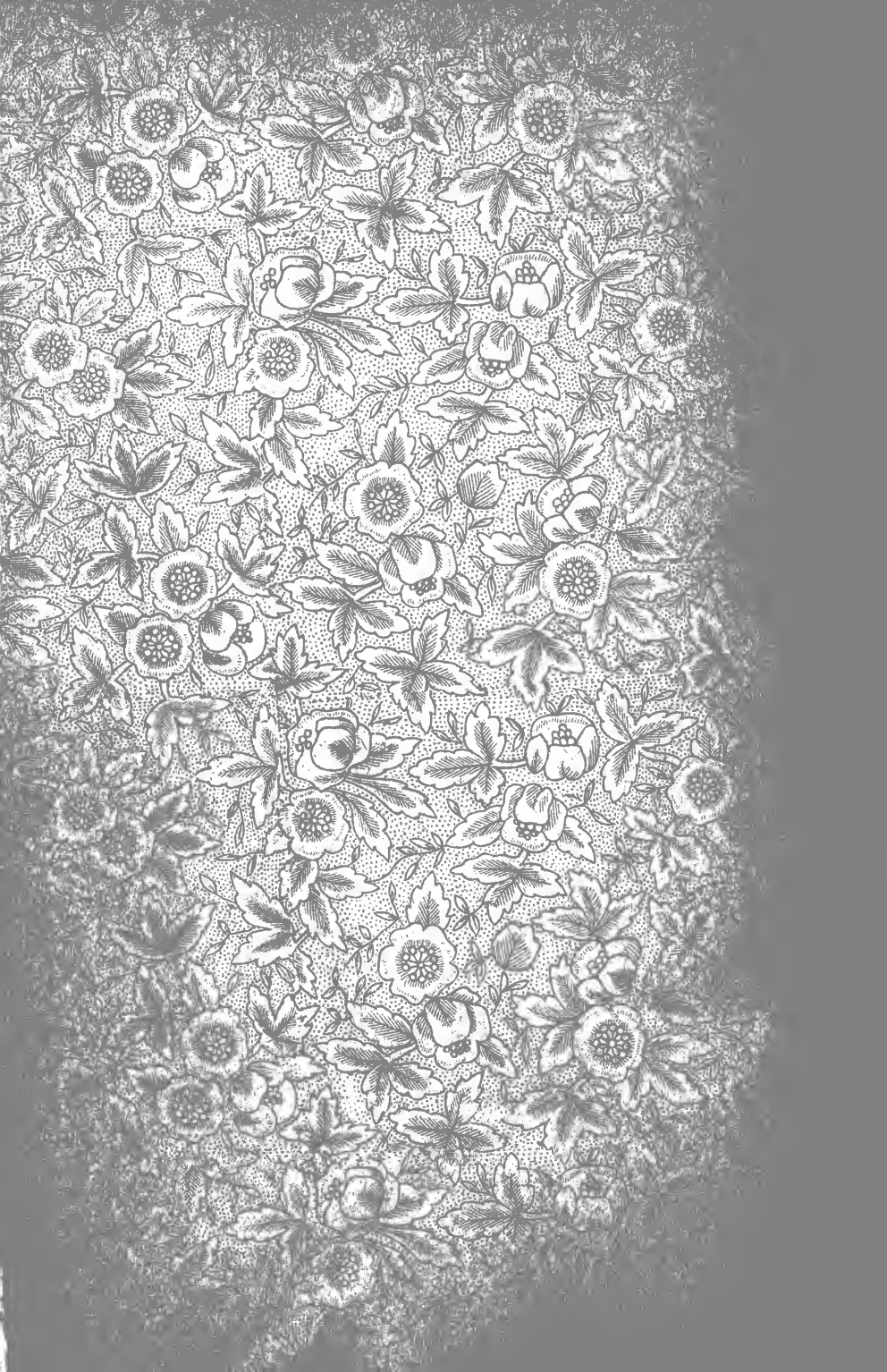
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